THE IRON TRADE REVIEW

VOLUME XXX. CLEVELAND, O. JULY 29, 1897. CHICAGO, ILL. NUMBER 30.

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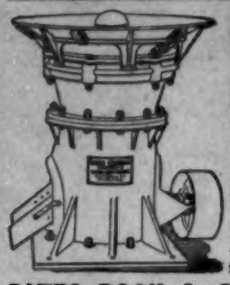

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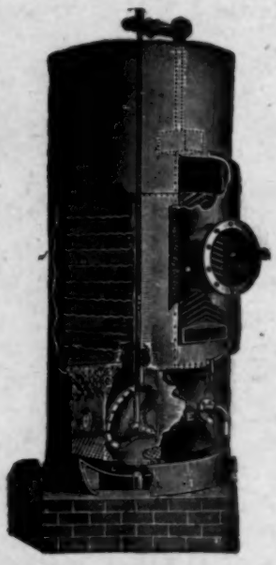

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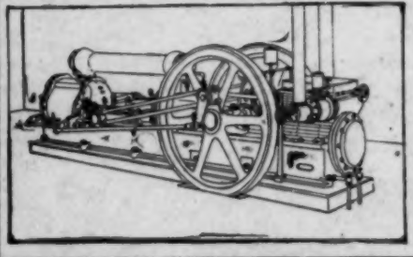

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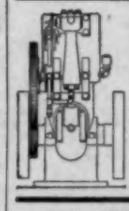

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THE IRON TRADE REVIEW

VOLUME XXX. CLEVELAND, O. JULY 29 1897 CHICAGO, ILL. NUMBER 30

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The passage of the tariff bill is not expected to affect the iron trade, except as it may get benefit from the stimulus given to other industries. With a few exceptions, the iron and steel duties in the old law were ample and they have not been materially changed. The tariff certainty that is now guaranteed for the next five years, and doubtless for longer, will be beneficial in giving stability to business and enlarging operations in all lines This, with the Western revival, now so well recognized, gives iron manufacturers reason to expect well of the last four months of the year. July has been a month of light business in pig iron but the aggregate of scattered orders for rolled products has given comfortable employment to such mills as labor troubles have not closed. Structural mills west of the Alleghenies have good orders on hand and will be busy for some weeks, while prospects for new work are reported excellent—building projects in the East and bridge and other work in the West. Just now Eastern mills are not so well supplied, and both by low prices and by guarantees of quick shipment they have been cutting quite a figure in the Central West in the past two or three weeks. Railroad requisitions continue of fair proportions and there is considerable new inquiry for rails, particularly in the Southwest and the Central West. The Chicago district has some good structural work in prospect and a ship plate order has just been placed there. Plates are quiet generally; sheets a trifle less firm with most of the mills going again. Bars, in spite of the four weeks' shut-down of valley mills, are no stronger, the concerns that are profiting by the idleness of the strongholds of unionism being ample, apparently, to supply all demands. Tin plate mills are concluding that either home demand is shrinking or that home production has been expanding in the pastyear beyond average calculations. Wages are higher but prices are lower and the market is flat. Steel has shown a little more activity in middle territory, in the week, at $13.75 in the valley, and $14 Pittsburg, with Cleveland close to a valley basis. Sheet bars have shaded $15.75 valley. The pig iron situation from the Southern furnace standpoint is unchanged. Northern furnaces have kept up low prices and are getting business naturally tributary to them, on strong foundry irons. There is some elasticity in Southern freight rates and a reduction of 15 cents north of the Ohio River is reported effective July 26. Statistics show that Tennessee stocks grew considerably in the first half year, while Alabama furnaces now have about six weeks' production unsold. In the North, Michigan charcoal iron shows heaviest gains in unsold stocks since Jan. 1. The Bessemer iron market at Pittsburg shows no change. There is practically no buying and quotations are unchanged, though the possibility of shading $9 in the valley is still asserted. Some figuring is reported by Eastern speculators, but no deals are authenticated as yet. The coal strike thus far is not a factor of moment in the iron market.

THE CLEVELAND DISTRICT.

The ore market is exceedingly quiet and no transactions of moment have been made in the past fortnight. Shipments in the week have been heavy and vessels have been getting somewhat better dispatch. The car problem is still a perplexing one, however, in view of the number of cars loaded with coal kept standing on sidings. Wild charters continue to be made at 40 cents Escanaba and 50 cents Marquette and Duluth. Offers of 60 cents on Septerber ore, from the head of the lake, do not interest vessel men, most of whom expect a considerably better figure for fall months. There is a good deal of ore yet to be bought, but furnacemen seem in no hurry.

Pig Iron The week has been almost devoid of sales in the local market. A transaction of the preceding week just reported is 1,500 tons of No. 4 Southern iron, on which the price was between $9 and $9.25. On full freight rates Alabama iron, No. 4, would be quoted $9.55, delivered in Cleveland. Foundry iron is apparently weaker, competition between Northern furnaces bringing out low quotations, $9 in the valley for No. 2 being a common quotation, with some furnaces shading it on prompt lots. Tod Furnace at Youngstown has blown in and August will add two or three others to the active list. Inquiries by Eastern speculators have been received by makers of Bessemer iron, and while some low figures are talked of, it does not appear that any transactions have been closed. Efforts to get iron for October, November and December deliveries at 25 cents above to-day's basis are reported. The market is still a waiting one and most independent steel works have sufficient iron for the next two months. Unsold stocks of iron in the Mahoning valley were 77,170 tons, June 30, against 78,332 tons at the close of 1896. In the Shenago valley the total was 28,567 on June 30, against 65,111 on Dec. 31.

Bessemer	$ 9 65	Valley Scotch No 1	$10 40@10 65
No. 1 Strong Foundry	10 25@10 65	Valley Scotch No. 2	10 00@10 15
No. 2 Strong Foundry	9 65@10 15	Gray Forge	8 65@ 8 75
No. 3 Foundry	9 25@ 9 50	Lake Superior Charcoal	12 75@13 00

Finished Material. Some inquiries for rails have come up in Central territory and track supplies are in good demand. Bridge works are all fairly employed and at a number of Northern Ohio points buildings are projected involving steel construction. Pittsburg mills are busy on structural work and the low prices recently quoted—going to 95c, Pittsburg, on combination orders for beams, channels and angles, and to 90c on the last-named—have been due to Eastern competition. Bars are quiet. The Amalgamated Association lodges at Youngstown will hold a meeting at once to consider the ultimatum of the manufacturers. The Cleveland Rolling Mill Co.'s wire department is closed down for lack of fuel, but other departments are running in part. We quote $1.05 on wire and $1.25 on wire nails. The local demand for sheets continues fair, with No. 27 selling at 1.90c. A local sheet mill has bought about 1,000 tons of slabs, divided between Pittsburg and Columbus. Some sheet-bar business is up, with quotations at $16.50 to $16.75, Cleveland delivery.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1142 MONADNOCK BLOCK, July 28.

The general conditions are not much changed from last week. The amount of business done was possibly increased a little, but the total tonnage closed was not large. One or two fairly good orders for various classes of materials were taken, but the bulk of the business closed was of the small order variety, and present inquiry does not indicate any large increase soon. The coal strikes have not as yet affected the iron trade in this part of the country to any great extent, although one or two more mills have found it necessary to stop altogether or shut down part of the plants because of a shortage in fuel. The supply of foundry coke has been ample so far. As a rule, business men in Chicago are looking for much better trade in the early fall, and it seems likely that their hopes will not be disappointed. Manufacturers of agricultural implements and other articles bought by farmers have had a very good trade for several weeks past, and the outlook for this class of trade in the future is most excellent. The agricultural implement manufacturers are nearly all running full time, with order books well filled, and have been making up a much larger stock than for several years past. Wagon makers are finding the same good business, and the general merchandising houses selling to the country trade are also doing well.

PIG IRON.—Both Northern and Southern furnaces report a rather quiet week, and no large demand to be satisfied in the immediate future. Deliveries on old contracts are good, and this is the most encouraging feature at present. Very few foundries are asking furnaces to hold up on deliveries, and a number are taking their iron faster than was contracted for. The Southern furnaces, in fact, are nearly all behind on their orders to this district. As long as this state of affairs continues prices will be firm, and at the present time there is nothing heard of any reductions. Freight rates from the South are understood to have been reduced 15 cents a ton, commencing July 26, the reduction being made by the roads north of the river. This, however, has not affected quotations so far. The Illinois Steel Co. has recently taken an order for 3,000 tons of basic Bessemer iron for shipment to Germany, as a sample, and this may lead to further orders in the future. This iron is made on specifications which call for unusually high phosphorus—higher than is used by American steel makers, with one exception. Further sales depend upon the satisfaction this iron gives the German users, and also upon the price which can be made in the future. Quotations are unchanged from last week:

Lake Sup. Charcoal	$13 00@13 25	Southern No. 1 Soft	$10 50@11 00
Local Coke Fdy. No. 1	10 50@10 75	Southern No. 2 Soft	10 00@10 50
Local Coke Fdy. No. 2	10 25@10 50	South'n Silveries	10 25@10 50
Local Coke Fdy. No. 3	10 00@10 25	Jackson Co. Silveries	13 00@15 00
Local Scotch Fdy. No. 1	10 50@10 75	Ohio Silveries	13 00@15 00
Local Scotch Fdy. No. 2	10 25@10 50	Ohio Strong Softeners	12 00@12 25
Local Scotch Fdy. No. 3	10 00@10 25	Alabama Car Wheel	15 50@16 00
South'n Coke No. 1	10 50@11 00	Malleable Bessemer	10 75@11 00
South'n Coke No. 2	10 00@10 25	Coke Bessemer	11 50@12 00
South'n Coke No. 3	9 75@10 00		

BARS.—Business has been small, and in only one or two cases have orders been taken which could be called large. The market is very firm, prices being about as they were last week. It is possible that an order for a large amount of iron or steel, with deliveries that are satisfactory to the mills, could be placed at figures a little under those we give but these fairly represent the market. Quotations are made at 1.10c to 1.20c for both common iron and steel bars from strictly billet stock, and 1.20c and up for guaranteed iron.

RAILS AND TRACK SUPPLIES.—Nearly all of the buying has been in small lots, but it includes orders for both light and heavy sections. The mill here is well filled with orders. Quotations are made: Rails, $19 to $21, according to specifications; steel splice bars, 1.20c to 1.30c; track bolts with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.55c to 1.60c.

BILLETS AND RODS.—Sales of billets and rods have been limited, and the market is about as at last report. Billets are quoted at $15 and rods at $20.50 to $21.

STRUCTURAL MATERIAL.—The Madison, Wis., library building will be let this week, taking about 700 tons of material. The material for the power house of the South Side Rapid Transit Co. (the Alley El,) amounting to about 800 tons, will also be let this week. Aside from these no contracts of any size are coming up immediately. There is to be further track elevation by the Ft. Wayne road soon, and this will take considerable material, and some additional contracts are to be let on the Drainage Canal, amounting to a large tonnage. General business is quite good, and orders for material under contract are very satisfactory to the mills. The market is firm, and quotations are being maintained. They are as follows: Beams and channels, 1.15c to 1.20c; angles, 1.10c to 1.15c; plates, 1.10c to 1.15c; tees, 1.30c to 1.40c. Small lots from stock are quoted one-quarter to one-half cent higher.

PLATES.—The local mills have taken an order for about 1,200 tons of plates for a barge to be built at the South Chicago ship yards, and other work of this character is expected to come up soon. Other business is confined to small lots in most cases, but the mills find sufficient demand to keep running all the time. Quotations are firm and are made as follows: Tank steel, 1.10c to 1.20c; flange steel, 1.30c to 1.35c; fire-box steel, 1.85c to 5c.

SHEETS—All the tonnage of the week was in small lots, no large buyers coming into the market. The outlook for the immediate future is not especially encouraging. Quotations are made at 1.90c to 2c for No. 27 black, and 80 and 5 to 85 and 10 per cent discount for galvanized.

MERCHANT STEEL—Some buyers have been in the market in the last week and one or two fairly good contracts have been placed. The general run of business has been small, however, and there is not much prospect of an increase soon. Quotations are as follows: Open-hearth spring, tire and machinery steel, 1.60c to 1.70c; smooth finished machinery steel, 1.50c to 1.55c; smooth finished tire, 1.35c to 1.40c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SCRAP.—Very little business of any character has been closed. There has been some trading in old wheels, which are quoted at $10.25 to $10.50. Prices on most grades of scrap are only nominal. Old iron rails are quoted at $11.50 to $12, old steel rails at $7.50 to $8 and old wheels at $10.25 to $10.50. Miscellaneous scrap is quoted about as follows: Railroad forge, $10.50 to $11; dealer's forge, $9 to $9.50; No. 1 mill, $7.50 to $8; heavy cast, net ton, $7.50 to $7.75; malleable cast, net ton, $8.50; axles, $13.75 to $14.25; cast borings, $2.75; wrought turnings, $4 to $4.50; axle turnings, $5.50 to $6; mixed steel, heavy, $6.25; stove plates, $5.50 to $6; heavy melting steel, $7.50 to $8.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
807 TRADESMEN'S BUILDING, July 28.

Uninterrupted operation of almost all local mills furnishes good evidence of expanding trade. Jones & Laughlins are behind orders, owing to delay in settling the finishing scale, but are now in full operation. The New Orleans drainage work taken by the Carnegie Steel Co. is a feature of the week's business. Coal is not as yet a disturbing factor to iron interests.

PIG IRON.—Sales of No. 2 foundry iron occurred in the week, the prices ranging about $9.50 for the next three months. Several 100-ton lots changed hands. An unauthenticated sale of the same grade is rumored at $9.25, the tonnage being much larger than of those taken at $9.50. Attempts have been made by outside speculators—whose ability to carry a large deal is questioned—to cover on gray forge and Bessemer for third quarter delivery. The efforts are believed to have been fruitless but the inquiry developed low quotations—below $9 in the valley for Bessemer. The Tod furnace at Youngstown blew in this week. Quotations are made on last week's basis, as follows:

Bessemer at valley furnace	$ 9.00 to $ 9.10
Bessemer delivered Pittsburg District	9.35 to 9.50
No. 1 Foundry	10.25 to 10.50
No. 2 Foundry	9.50 to 9.75
No. 3 Foundry	9.00 to 9.25
Gray Forge	8.25 to 8.50

BILLETS.—An order placed in Pittsburg for 1,000 tons of billets brought $14.10—a somewhat better figure than recent estimates of the market. Local quotations are $14 to $14.25. In the valleys $13.75 is quoted.

STRUCTURAL MATERIAL.—The National Construction Co., of New York, has the contract for the New Orleans drainage work and the plain material will be Carnegie steel. Beams constitute the bulk of the tonnage, which amounts to about 1,400 tons. The new Jenkins building to replace the one destroyed in the Pittsburg fire of May 3, has been designed and 1,000 tons of steel will enter into the construction. The gen-

eral contract is to be let this week. Beams and channels of all sizes are quoted at 1c. angles and plates 95c to 1c, and tees and zees at 1.15c to 1.25c.

IRON AND STEEL SKELP.—Owing to idleness of union skelp mills prices on all grades of skelp are firmly held. A slight increase in tonnage has also resulted. We quote: Grooved steel skelp, 92½c to 95c; sheared steel skelp, 1c to 1.05c; grooved iron skelp, 1c to 1.05c; sheared iron skelp, 1.15c to 1.17½c.

FERRO-MANGANESE.—Domestic, 80 per cent, is quoted at $45 to $45.50.

BARS.—Pending the conference on the puddling and finishing scale on Aug. 2, only the non-union bar iron mills are active, but in this district this includes most of them. Common iron is held at 95c to 1c and 90c is possible in the valley for product in stock. Muck bar is quiet at $17.75. In steel bars .90c to .95c is asked.

PIPES AND TUBES.—No action looking toward immediate resumption was taken by the Duquesne Tube Works Co. last week, but this step may come before long. Individual quotations of the leading pipe mills are maintained at the higher level and unprofitable business is refused. Discounts are made as follows: Merchant black, 57 to 67 per cent off; galvanized, 52 to 55 per cent off; six tens for less than carload lots, six tens and 2½ per cent on carload lots. On boiler tubes discounts are as follows: Two and a quarter-inch and smaller, 75 per cent discount, 2½ inches and over, 75 and 10 per cent discount. The following quotations on casing are firmly maintained: Screw and socket joint, 62½ per cent discount; inserted joint, 57½ per cent discount.

SHEETS.—Although the lowest prices yet made on black sheets can easily be duplicated now, it is a strange fact that prompt deliveries are most difficult to get and in some gauges the scarcity is pronounced. Yet for September and October deliveries the present low scale of prices can easily be had. The same state of affairs exists in tin plate. Prices trend downward and prompt deliveries are not obtainable. Galvanized offered at 80 and ten off were refused in the week, lower quotations having been made by mills more eager to sell. On black sheets we quote: No. 26, 1.80c to 1.85c; No. 27, 1.85c to 1.90c; No. 28, 1.90c to 1.95c.

RAILROAD AND TRACK SUPPLIES.—Splice bar and spike demands are unusually large just now. Rail specifications continue heavy. Quotations are made as follows: Splice bars, 1.10c to 1.15c; track bolts, iron, 1.65c to 1.70c; steel spikes, 1.45c to 1.55c. Links and pins are quoted at 1.20c to 1.25c.

MERCHANT STEEL.—Quotations are made as follows: Open-hearth spring, 1.35c to 1.40c; open-hearth machinery, 1.15c to 1.20c; machine straightened tire, 1.25c to 1.30c; soft steel bars, 1.25c; toe calk, 1.35c to 1.40c; sleigh shoe, 1.25c; tool steel, ordinary, 5c to 7c; branded, 10c upwards.

OLD MATERIAL.—Car wheels are a drug on the market and local dealers have been shipping to Buffalo, where they are in better demand. They are quoted here at $8.50 to $8.60. We note a sale of 300 tons, gross, at $8.50. No. 1 wrought scrap is held at about $10, net, and several 100-ton lots brought about this price during the week. Two 500-ton lots of mixed and short length old steel rails respectively brought $9.65 in Pittsburg. For forward deliveries old steel rails are higher.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Cincinnati. July has not been a good month for Southern iron, so far as volume of sales is concerned. The size of unsold stocks at furnaces in the South is not a favorable symptom. In Alabama, the gain in the past six months has been only from 122,000 to 129,000, though this is a large total; but in Tennessee the stocks in furnace yards have increased from 29,000 on Dec. 31, to 55,000 on June 30. In addition is the fact that some furnaces that have been out for some time are preparing to blow in soon. The low prices made by Northern furnaces are still shutting out Southern sellers in several districts; yet some of the latter are holding quite firmly for quoted prices. This fact makes the seller's position stronger than would be inferred from present dullness. It is noted that requests for withholding shipments are fewer than would be expected at this time of year. Current orders are nearly all for small amounts and early delivery, showing that consumers are not carrying heavy stocks. Manufacturers of iron and steel products believe that the conditions of the country are such that a large business this fall is inevitable. One of them having an extensive foreign trade, said that better conditions could hardly be desired. We quote for cash, f.o.b. cars Cincinnati: Southern coke, No. 1 foundry, $9.75; No. 2, $9; No. 3, $8.75; gray forge, $8.50; mottled, $8.50; No. 1 soft, $9.50; No. 2 soft, $9; Hanging Rock charcoal, No. 1, $14.50 to $15.50; Tennessee charcoal, No. 1, $12.50 to $13; Jackson County silvery, No. 1, $12.50 to $13; Standard Georgia car wheel, $14.25 to $15; Tennessee car wheel, $13 to $14.

Buffalo. There has been during the past week quite a noticeable increase in the requests for immediate shipment of foundry iron on existing contracts. We have noticed a better feeling among foundries in general. Some running on special lines of work are quite busy. Others depending upon car contracts are running rather light. Taken as a whole, however, the foundries in this vicinity can be considered fairly active. Several good sized orders have been entered by local furnaces for both foundry and malleable iron, but there has been very little if any improvement in prices. We quote below on the cash basis f.o.b cars Buffalo: No. 1 foundry, $10.50 to $10.75; No. 2 $10.25 to $10.50; Ohio strong softener No. 1, $10.50 to $10.75.; No. 2, $10.25 to $10.50; Jackson County silvery No. 1, $13.50 to $14; Southern soft No. 1, $10.75; No. 2, $10.50.

THE TIN PLATE MARKET.

The passage of the tariff bill, increasing the tin plate duty from 1.2c per lb. to 1.5c, has not caused the slightest stir in the present stagnant market. Buyers realize that all the mills will be anxious for orders and they are waiting. The only trading going on is in far futures and largely speculative. It is easily a buyer's market and with each mill that re-enters the market as a seller there is a drop of at least 2½ cents per box.

In the East, can-makers are reported fairly busy and some spot lots of plates have changed hands at prices much better than those obtainable for future deliveries. It is evident that one of two things is true, either that the country is not consuming anything like the quantity of plates used in former years, or the production of the American mills is much larger than the usual estimates. The foreign market is reported very dull and flat with many of the mills shut down and more likely to close, unless conditions improve in the near future.

We quote as follows for deliveries from Sept., 1897, to July, 1898, f.o.b. cars maker's mills:

CHARCOAL TINS.

	IC	IX
Lisvane Grade,	$3.60	$4.35
Calland Grade,	3.80	4.55

COKE TINS.

IC, 108, Basis weight,	$3.05
100 lb. " "	2.95
95 lb. " "	2.90
90 lb. " "	2.85
85 lb. " "	2.80
80 lb. " "	2.75

TERNE PLATES.

IC, 216 lb., 20 x 28	$6.00
200 lb. "	5.70

THE Chicago Ship Building Co. has just been given a contract by Chicago and Cleveland interests to build a steel tow barge of 376 feet keel, 48 feet beam and 26 feet depth, to be in all respects a duplicate of the steel schooners Amazon and Polynesia, except that her beam will be two feet greater. The Amazon has established a 6,000-ton (net) cargo record from Lake Superior, and the Polynesia has just taken down 6,134 net tons of ore. There is some work on hand now at most of the large lake shipyards. The Globe Iron Works, Cleveland, have two revenue cutters, the Union Dry Dock Co., Detroit, has a large vessel, and F. W. Wheeler & Co., Bay City, have two large tugs. There is promise of some large work late in the year.

THE George B. Sennett Co. has been incorporated at Youngstown, O., with a capital of $100,000 to manufacture heavy machinery. The Sennett plant at Youngstown has been in operation for some time.

THE IRON TRADE REVIEW

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THE RATE OF PIG IRON CONSUMPTION.

The unsatisfactory behavior of iron and steel prices, particularly in the past year, often leads to wrong conclusions as to the consumption of material. Iron manufacturers often sigh for the return of such a volume of business as was done in 1892, for example, without appreciating how close to the rate of 1892 the country has approached, in this unsatisfactory year 1897, in its use of iron. The statistics of unsold stocks and of production in a series of years do not furnish an accurate basis for computing consumption; yet they indicate approximately what it is. There may be more iron in a maker's yard, intended for his own use, at one time than at another; but the statistics do not show this. There may be a larger amount of sold, yet unshipped, iron at the maker's furnace on one statistical date than on another. And again, the amount of iron in consumers' hands may be larger at the end of one year than of another. It must be assumed, in computing consumption from figures showing stocks and production, that the above factors do not vary greatly. And since the official stock figures are taken at the end and in the middle of the year, when consumers aim to have stocks on hand worked down to a low point, the variations referred to are doubtless at a minimum.

Computing in the way stated, we find the consumption of pig iron in the United States in the three years 1890, 1891 and 1892 to be 26,981,136 gross tons, or an average of 8,793,712 gross tons a year in that period. In 1892 the consumption ran up, being, on the basis of stock and production figures, 9,247,000 gross tons. The production for 1892 and subsequent years has been as follows:

Year.	Gross Tons.	Year.	Gross Tons.
1892	9,157,000	1895	9,446,308
1893	7,124,502	1896	8,623,127
1894	6,657,388	Half of 1897	4,403,476

Unsold stocks at the close of 1894 were 661,328 tons; on June 30, this year, they were 973,678—an increase of 312,000 tons. Production for the 2½ years ending June 30, 1897, aggregated 22,472,911 tons, or at an average yearly rate of 8,989,164 tons. With a reduction for increasing stocks, the consumption appears to have averaged 8,870,000 tons a year since 1894—or 77,000 tons a year more than the average for the last three years of prosperity, 1890, 1891 and 1892. For the first half of 1897 the apparent consumption has been at a yearly rate of 8,556,000 tons, or only 240,000 tons less than the average for 1890, 1891 and 1892.

One explanation of the unprecedentedly low prices of 1897, concurrently with a consumption so large as statistics show it to be, is the familiar fact of general rebuilding and re-equipment of furnaces in the past three or four years, putting effective producing capacity so far in advance of what it was in the days—recent days, too—of $15 to $18 pig iron. Certainly little encouragement can be found in the figures cited, for the hopes now and then expressed, for the return of the profits of 1892 and the two years preceding, which at the time were considered far from satisfactory.

A WAGE CRISIS IN THE VALLEYS.

The wage situation in the Mahoning valley has reached a crisis in the past week and some definite development may be expected before Monday, Aug. 2, the date to which the last conference adjourned. The officers of the four important mills at Youngstown met representatives of their employes—a separate meeting at each establishment—on Monday, and substantially the Pittsburg scale was presented. Each mill offered to start up, with puddling at $4 and a reduction of 15 per cent in the finishing scale, and on guide mills 40 cents off on all billets up to 4 x 4 inches. No higher price than $4 for puddling is paid at Pittsburg, and all the finishing mills there but one are running, paying about 15 per cent less than the scale the valley manufacturers are asked to sign. The offer made at Youngstown Monday has not been accepted thus far, but within a day or two the Amalgamated men in the valley will give an answer that will decide the status of their organization in that district for some time to come.

The iron manufacturers of the Mahoning valley are naturally tired of bearing, year after year, the brunt of the scale contest, while other mills start up promptly, after making repairs, and by agreeing to pay the rate finally decided upon, get what business is going, valley mills looking on while their trade is diverted. The Amalgamated Association encourages these conditional scale signatures, and has persistently used them to whip in the valley mills, the latter having simply to choose between paying a scale out of all proportion to the market and losing—in some cases permanently—a trade that cannot wait.

Another injustice to which valley manufacturers are subjected because of their close alliance with the Amalgamated Association is in the policy the latter has pursued in the Pittsburg district. The competition of non-union iron mills in the Pittsburg district has long been a serious drawback to the valley mills, but this year there is added to this the making of a special scale by two Pittsburg mills, treating not with the Amalgamated Association, but with the lodges within their own mills. The license thus given the union men in a mill to change the regular scale, to secure agreement with their em

ployers, naturally impressed the valley manufacturers as a strange piece of discrimination against a district that had always been solidly on a scale basis. And while these Pittsburg mills, ostensibly union, have been given a scale of their own, Youngstown workers still hold out for a scale which puts their employers at a disadvantage in the market and blandly ask them to sign it and open their mills.

The men in the valleys are not only giving their associates in Pittsburg mills the work that is being taken from valley mills, but they are parties to an unfair attempt to force upon valley manufacturers a higher scale of wages than they are granting in a competing district—an attempt which we look to see fail, as it ought to fail.

The Pittsburg end of the Amalgamated Association is evidently too astutely handled for the good of the members in the valleys. If the latter cannot see this now, the sturdy resistance of valley mill owners to their unjust demands may at length open their eyes to the true situation.

STOCKS of Lake Superior charcoal iron are getting up to a figure that can scarcely be considered an invitation to idle furnaces to get in blast.. They were 125,000 tons on June 30, as compared with 78,000 tons Dec. 31, 1896; 36,000 tons at the end of June last year and 30,000 tons at the close of 1895.

THE NEW TARIFF LAW

When the Dingley tariff bill passed the House, we gave in detail the provisions of the metal schedule. Later we noted the changes which the Senate Finance Committee recommended, nearly all of which were adopted by the Senate. Last week we noted the chief features of iron and steel duties, as agreed on in conference. We have before us the bill, as it finally passed both branches, the Senate ratifying the conference agreement on Saturday afternoon, July 24, and the President affixing his signature an hour later. We have not space to reproduce the metal schedule literally and in its entirety. For this reason, and because of what we have already printed, and, further, because an iron and steel tariff in its minutiæ is not the matter of great moment to manufacturers that it used to be, we content ourselves with noting the provisions applying to iron and steel, in an abbreviated form, with appended comparison with the McKinley and Wilson tariffs, where the classification is identical:

Iron ore, 40c. (Wilson, 40c; McK., 75c.)

Pig iron, spiegel, ferro and scrap, $4 per ton. (Wilson, $4; McK., $6.72.)

Bar iron not less than 1 inch wide nor ⅛ inch thick, and round iron not less than $\frac{7}{16}$-inch diameter, .6c per lb. (Wilson, .6c; McK., .8, .9, and 1c.)

Round iron less than $\frac{7}{16}$ inch diameter, and bars or shapes of iron not specially provided for, .8c per lb. (Wilson, .8c; McK., 1.1c.) Iron in slabs, .5c per lb. Charcoal iron bars, blooms, etc., $12 per ton. (Wilson, $12; McK., $22.)

Beams, girders, etc., .5c per lb. (Wilson, .6c; McK., .9c.)

Boiler plates, thicker than No. 10 gauge, valued at 1c per lb. or less, .5c per lb. (Wilson, 5c; McK., 5c); above 1c and less than 2c., .6c per lb. (Wilson, .6c; McK., .8c); valued at 2c to 4c per lb., 1c per lb. (Wilson, 30 per cent; McK., 1.5c.); valued over 4c, 25 per cent, (Wilson, 25 per cent; McK., 2c.)

Anchors, 1.5c per lb. (Wilson. 1.5c; McK., 2.3c.) Forgings, 35 per cent. (Wilson, 1.5c per lb.; McK., 2.3c.)

Hoop, band or scroll iron or steel, valued at 3c per lb. or less, 8 inches wide or less and less than ⅛ inch thick, but not thinner than No. 10 wire gauge, .5c per lb. (Wilson, 30 per cent.; McK., 1c); No. 10 to No. 20 gauge, .6c per lb. (Wilson, 30 per cent; McK., 1.1c); thinner than No. 20, .8c per lb. (Wilson, 30 per cent.; McK., 1.3c). Barrel hoops, or hoop iron or steel, flared, splayed or punched, .1c more per lb. than the hoop iron from which it is made.

Cotton ties, .3c per lb. (Wilson, free; McK., .2c per lb. more than hoops from which made.)

Rails, 7-20c per lb. (Wilson, 7-20c; McK., .6c). Fish plates or splice bars, .4c per lb. (Wilson, 7-20c; McK., .6c.)

Sheets and skelp, valued 3c per lb. or less, No. 10 to No. 20 wire gauge, .7c per lb. (Wilson, .7c; McK., 1c); No. 20 to No. 25 wire gauge, .8c per lb. (Wilson, .8c; McK., 1.1c); No. 25 to No. 32 wire gauge, 1.1c per lb. (Wilson, 1.1c; McK., 1.4c); thinner than No. 32, 1.2c per lb. (Wilson, 1.1c; McK., 1.4c); corrugated, 1.1c (McK., 1.4c.)

Galvanized sheets, plates, hoops, etc., .2c per lb. more than black. (Wilson, ¼c more; McK., ¾c more.)

Sheets polished, planished or glanced, 2c per lb. (Wilson, 1¾c; McK., 2½c.) Pickled or cold rolled, .2c per lb. more than corresponding gauges of common black. (Wilson, ½c more; McK., ¼c more.)

Tin and terne plates, 1.5c per lb. (Wilson, 1.2c; McK., 2.2c.)

Steel ingots, billets, mill shafting, steel castings, etc., valued at 1c per lb. or less, .3c per lb. (Wilson, .3c; McK., .4c); other valuations graduated into 10 classes, with duties increasing with values, up to 4.7c duty on castings valued above 16c per lb. (Wilson, 4.7c; McK., 7c.)

Wire rods, valued at 4c per lb. or less, .4c per lb. (Wilson, .4c; McK., .6c); over 4c per lb., ¾c per lb. (Wilson, ¾c; McK., .6c). Tempered or partly manufactured rods, ½c per lb. additional.

Wire not smaller than No. 13 wire gauge, 1¼c per lb. (Wilson, 1¼c; McK., 1¾); smaller than No. 13 and not smaller than No. 16, 1½c per lb. (Wilson, 1½c; McK., 1¾); smaller than No. 16, 2c per lb. (Wilson, 2c; McK., 2¼c) Where valued above 4c per lb., 40 per cent. Hat wire, piano wire, corset wire, etc., covered or uncovered, valued above 4c per lb., 45 per cent (Wilson, 40 per cent; McK., 50 per cent). Articles manufactured from wire 1¼c per lb. in addition to the duty on the wire. (Wison, 1c; McK., 2c.) Wire rope, 1c per lb. in addition to duty on the wire; on wire coated with zinc, tin or other metal, .2c per lb. in addition to duty on plain wire.

Anvils, 1⅞c per lb. (Wilson, 1¾c; McK., 2½c.)

Axles, valued not more than 6c per lb., 1c per lb. (Wilson, 1½c; McK., 2c.) When fitted in wheels, same rate as wheels.

Bolts, 1½c per lb. (Wilson, 1½c; McK., 2¼c.)

Cast iron pipe, .4c per lb. (Wilson, .6c; McK., .9c)

Cast iron vessels, plates, etc., .8c (Wilson, .8c; McK., 2.2c.)

Malleable castings, .9c per lb. (Wilson, .9c; McK., 1.75.c)

Chains, not less than ¼ inch diameter, 1½c per lb. (Wilson, 30 per cent; McK., 1.6c; graduated duties for smaller diameter.

Boiler tubes, flues or stays, not thinner than No. 16 wire gauge, 2c per lb. (Wilson, 25 per cent; McK., 2½c); other tubes, 35 per cent.

Files, 30c, 50c, 75c and $1 per doz, according to lengths (Wilson, 35c, 60c, 60c and $1; McK., 35c, 60c, 60c and $2).

Cut nails and spikes, .6c per lb. (Wilson, 22½ per cent; McK., 1c.)

Wire nails, not less than 1 in long and not lighter than No. 16 wire gauge, ½c per lb. (Wilson, 25 per cent; McK., 2c); less than 1 inch and lighter than No. 16, 1c per lb. (Wilson, 25 per cent; McK., 4c).

Rivets, 2c per lb. (Wilson, 25 per cent; McK., 2½c).

Screws, more than 2 inches long, 4c per lb. (Wilson, 3c; McK., 5c); 1 inch to 2 inches, 6c per lb. (Wilson, 5c; Mc., 7c); ½ inch to 1 inch, 8½c per lb. (Wilson, 7c; McK., 10c); ½ inch and less, 12c (Wilson, 10c; McK., 14c).

Wheels and tires, 1½c per lb. (Wilson, 1¼c; McK., 2½c). Cogged ingots or blanks for same, 1¼c per lb. (Wilson, 1¼c; McK., 1¾.)

It will be noticed that in the main the Wilson-Gorman duties on iron and steel are quite closely adhered to in the new law.

IN addition to what was said last week as to the financial outcome of the Detroit convention of the American Foundrymen's Association, we are glad to note that the finance committee finds itself able to make a dividend, there being a surplus of $600 to $700, with all expenses paid. This is so unusual a record that it is worthy of special notice and commendation.

PIG IRON PRODUCTION, FIRST HALF OF 1897.

The statistics just gathered by General Manager Swank, of the American Iron and Steel Association, and given in detail in the tables below, show that the total production of pig iron in the United States in the first half of 1897 was 4,403,476 gross tons, against 4,976,236 tons in the first half of 1896 and 3,646,891 tons in the second half of 1896. As compared with the first half of 1896 there was a decrease in the first half of 1897 of 572,760 tons, but as compared with the second half of 1896 there was an increase of 756,585 tons. The following table gives the blast furnace situation on June 30, as compared with Dec. 31. It also gives production by States. It appears that a greater output was made in the past six months than in the second half of 1896, by Massachusetts, New York, New Jersey, Pennsylvania, Maryland, Georgia, Texas, West Virginia, Tennessee, Ohio and Illinois. The following States show a decrease: Connecticut, Virginia, Alabama, Kentucky, Michigan, Wisconsin, Missouri, and Colorado. The two charcoal furnaces on the Pacific Coast, one in Oregon and one in the State of Washington, have not made pig iron for several years; North Carolina has produced no pig iron since the first half of 1896; and for the first time for many years Colorado does not appear as a pig iron producer in mid-year statistics, the three Colorado furnaces having all been idle since September, 1896.

TOTAL PRODUCTION OF PIG IRON.

States.	Blast Furnaces. In blast Dec. 31, '96	June 30, 1897. In	Out	Total	Production. Gross tons of 2,240 lbs. (Includes spiegeleisen.) First half of 1896.	Second half of 1896.	First half of 1897.
Massachusetts	1	1	2	3	893	980	1,702
Connecticut	2	2	4	6	3,656	6,531	3,172
New York	5	4	17	21	99,870	106,205	108,929
New Jersey	3	4	8	12	34,435	24,728	37,863
Pennsylvania	64	61	117	178	2,246,753	1,777,413	2,149,252
Maryland	1	3	6	9	51,807	27,665	80,333
Virginia	11	8	19	27	231,685	154,592	153,472
North Carolina			2	2	2,151		
Georgia	1	1	4	5	7,593	8,000	8,141
Alabama	15	16	34	50	464,205	457,965	436,505
Texas		1	3	4	1,131	90	2,604
West Virginia	2	2	2	4	68,421	40,148	53,735
Kentucky	3	2	7	9	44,450	26,210	17,185
Tennessee	7	7	14	21	134,354	113,984	140,431
Ohio	27	20	43	63	743,444	452,882	593,962
Indiana			2	2			
Illinois	7	9	8	17	638,186	267,053	519,671
Michigan	7	4	12	16	65,193	84,318	61,531
Wisconsin	2	1	5	6	102,586	55,898	29,773
Minnesota			1	1			
Missouri	1		4	4	4,758	7,790	5,215
Colorado			3	3	30,665	14,439	
Oregon			1	1			
Washington			1	1			
Total	159	146	319	465	4,976 236	3,646,891	4,403,476

Production according to fuel, in the half year, and the two six months periods preceding, is shown in the next table, together with unsold stocks of bituminous, anthracite and charcoal iron at the end of the last four periods of six months:

UNSOLD STOCKS AND PRODUCTION ACCORDING TO FUEL.

Fuel.	Stocks. Gross tons of 2,240 lbs. Dec. 31, 1895.	June 30, 1896.	Dec. 31, 1896.	June 30, 1897.	Production. Gross tons of 2,240 lbs. (Includes spiegeleisen.) First half of 1896.	Second half of 1896.	First half of 1897.
Bituminous	193,363	390,883	383,928	446,114	4,155,528	3,010,943	3,804,882
Anthracite	115,536	113,311	134,687	143,590	684,011	462,401	473,837
Charcoal	135,033	140,693	193,034	237,459	136,697	173,547	124,757
Total	444,332	644,887	711,649	827,163	4,976,236	3,646,891	4,403,476

There was a considerable increase in unsold stocks in the first half of the year. The figures above, showing a total of 827,163 tons unsold June 30 do not include pig iron sold and not removed from the furnace bank, nor pig iron manufactured by rolling mill proprietors for their own use. Of pig iron storage warrant stocks they take in 75,085 tons that on June 30 were still in control of the makers. The part in these yards June 30 not controlled by the makers amounted to 146,515 tons, which, added to the 827,163 tons above mentioned, makes a total of 973,678 gross tons of pig iron on the market at that date, against a similar total of 847,686 tons on Dec. 31, 1896. The total stocks in the warrant yards on June 30, 1897, amounted to 221,600 tons, of which almost four-fifths was held in the South.

It will be of interest to note the distribution of unsold stocks of charcoal and coke iron. This is shown in the next two tables.

STOCKS OF UNSOLD CHARCOAL PIG IRON.

States.	Dec. 31, 1895.	June 30 1896.	Dec. 31, 1896.	June 30, 1897
New England	9,058	8,447	7,989	9,073
New York	12,858	13,150	13,280	12,063
Pennsylvania	9,271	7,251	7,129	7,164
Maryland	1,449	1,205	1,544	1,209
Va., N. C., Ga., and Texas	17,150	16 980	17,181	9,358
Alabama	23,839	30,201	33,837	27,273
Kentucky and Tennessee	4,014	7,428	13,211	17,458
Ohio	16,396	12,752	13,812	11,796
Michigan	23,040	28,656	64,035	101,603
Wisconsin	6,954	7,779	13,973	24,173
Missouri	9,804	5,593	5,652	5,102
Pacific States	1,2 0	1,191	1,191	1,187
Total	135,033	140 693	193,034	237,459

STOCKS OF UNSOLD COKE PIG IRON.

New York		1,100	13,400	39,686
Pennsylvania	61,866	152,943	100,767	78,541
Maryland and Virginia	33,411	51,539	42,194	66,315
Alabama, Georgia, and N. C.	45,034	65,375	90,703	103,996
Kentucky and Tennessee	12,151	19,547	30,752	50,337
Ohio	32,773	100,359	104,852	107,339
Illinois, Wisconsin, and Minn.	7,165	50	1,260	
Missouri and Colorado	963			
Total	193,363	390,883	383,928	446,114

The production of spiegeleisen and ferromanganese in the first half of 1897 was 80,622 gross tons, against 83,010 tons in the first half of 1896 and 48,930 tons in the second half.

The production of basic pig iron is a factor of increasing interest. It will be noticed that the output this year promises to exceed very considerably that of 1896:

PRODUCTION OF BASIC PIG IRON.

States—Gross Tons.	First half, 1896.	Second half, 1896.	First half, 1897.
New England, New York, New Jersey	6,171	16,521	27,916
Pennsylvania—Allegheny county	88,573	79,622	139,970
Other counties	38 87,	12,893	58,473
Maryland, Virginia, Alabama	47,546	26,058	42,741
Ohio, Illinois, Wisconsin	10,522	9,722	12,510
Total	191,687	144,716	281,610

The following tables give the production of Bessemer pig iron by States and in the various districts of Pennsylvania and Ohio:

PRODUCTION OF BESSEMER PIG IRON.

States.	1st half 1896.	2nd half 1896.	1st half 1897.
Pennsylvania	1,552,378	1,244,506	1,503,219
Maryland	40 867	23,761	58,222
West Virginia	68,421	30,854	53,735
Kentucky	600		
North Carolina	2,151		
Ohio	499 299	299,762	416,782
Illinois	575,215	232,296	461,917
Michigan and Wisconsin	14,008	11 446	2,103
Missouri	3,198		
Colorado	27,535	12,6-8	
Total	2,793,672	1,861,283	2,495,978

BESSEMER PRODUCTION IN PENNSYLVANIA AND OHIO.

Pennsylvania.	Lehigh Valley	76,437	39,857	59,718
	Schuylkill Valley	20,068	2,481	32,833
	Upper Susquehanna Valley	58,962	45,786	40,222
	Lower Susquehanna Valley	158,250	87,103	87,956
	Juniata Valley			
	Shenango Valley	251,156	116,163	165,311
	Allegheny County	860,762	845,045	965,219
	Miscellaneous bituminous	126,743	108,071	151,960
Ohio.	Mahoning Valley and H. Rock bit.	170,860	108,649	155,248
	Hocking Valley	10,515	3,830	2,420
	Lake Counties	127,361	101,398	118,304
	Miscellaneous bituminous	199,563	85,885	140,810

Ohio's production of Bessemer pig iron was greater than that of Illinois in 1895, but last year the latter State resumed its place next to Pennsylvania and has kept it in the first half of 1897. For the past 18 months the output of Bessemer steel in Illinois has been unprecedentedly large, indicating the expansion of the business of the Illinois Steel Co. It is interesting to notice, also, how the output of Bessemer pig has grown in Allegheny County.

THE disagreement between the coal miners and operators in the Birmingham, Ala., district has been ended by compromise, the operators agreeing to pay the miners 37½ cents per ton, a reduction of 2½. This settlement includes the miners of the Tennessee Coal, Iron & Railroad Co., and of the Sloss Iron & Steel Co.

FOUNDRY CHEMISTRY IN PRACTICE.

In addition to the data contained in letters from large foundries in the Central West and Northwest, given in our issue of last week, the following letter will be found an interesting contribution to current comment on the practical application of chemistry to foundry buying and foundry operations. It is from one of the largest concerns in the Northwest engaged in the manufacture of agricultural machinery. The specifications on which it buys pig iron are identical with those printed in last week's article, as employed by another important company manufacturing for the implement trade. The superintendent of the foundry department gives these additional details concerning the use made of chemical analysis:

"The iron used in our foundry is mixed by analysis, and if care be taken in weighing the pig, coke, etc., the resultant castings are all that could be asked for We find that with phosphorus and manganese not above our specification it is necessary only to pay attention to the two metalloids, silicon and sulphur. For small soft castings (i.e., thin plate), we figure 2.50 per cent silicon; for pulleys and unequal castings, 2.35 per cent silicon. For general foundry work, 2.15 to 2.25 per cent of silicon has given the best results, and even pulleys and some very light castings in this mix are excellent.

"Sulphur plays a very important part in mixing by analysis. If above 0.085 per cent the iron begins to be brittle, and at 0.120 per cent is worthless—at least, our experience has proved this. We aim to keep the sulphur from rising above 0.085 or 0.090 per cent, at most, and usually keep it down to 0.065. As a rule, coke gives 4 per cent of its sulphur to the iron in the cupola. Thus, if the mix figures 0.052 per cent of sulphur in the pig, and the coke 0.75 per cent., we add 4 per cent of 0.75 = 0.030 to the mix, making the resultant casting 0.052 + 0.030 = 0.082 per cent sulphur, and an analysis of the castings invariably bears out the rule. It is customary, however, to add 0.030 per cent, no matter if the coke show les than 0.75 sulphur.

"In cylinders, where a close-grained and medium hard iron is wanted, we aim to have the silicon from 1.30 to 1.75 per cent, and sulphur as low as possible. A cylinder with 1.30 silicon and 0.055 sulphur is quite easily machined, whereas one with the same silicon per cent, but with 0.095 per cent of sulphur invariably works hard.

"Our method of mixing by analysis is quite simple, and the results for the past year are excellent. With the foundry foreman familiar with the analysis method, the castings have run 2.15 per cent silicon, with a variation not to exceed 0.35 per cent., either way, during the season. Careful mixing and weighing are essential to a uniform iron; also perfect sampling of the pig, coke, flux, etc. When a car of iron is received, it is sampled before unloading. Sometimes as many as 20 pigs are broken before satisfactory samples are obtained. Good sampling is as important as an analysis, perhaps more so, as an analysis of the iron not representing a general average of the car would be misleading. If the care of iron is accepted, it is then unloaded and nicely piled, each pile numbered, and the pile number, car number and date of receiving marked on the envelope used for the borings from the sample pigs. In sampling, an open grain, medium, and a close-grained pig are usually chosen for a sample, the sampler proportioning them according to the amount of each in his judgment. In making the analysis, only two constituents are usually determined, viz.: Silicon and sulphur; although about once a month a complete analysis of each brand is made, in order to note the variation in phosphorus, manganese and carbon.

"In mixing, we allow a loss of 0.15 per cent on silicon. This may vary, however, being influenced by the amount of fuel used and the heat generated.

"In our own case, this per cent of loss appears to be about the right figure.

		Silicon.		Cupola Mixture.			
Pig (Pile or brand)	No. 1	2.80 per cent	x	40 per cent	=	1.120 %
" "	No. 2	2.30 "	x	10 "	=	.230 "
" "	No. 3	1.50 "	x	05 "	=	.075 "
Home scrap, Sprues, etc		2.20 "	x	30 "	=	.660 "
Foreign Scrap		1.50 "	x	15 "	=	.225 "
				1.00%	=	2.31
Loss					=	.15
Silicon in castings					=	2.16 %

"In a silicon calculation, the required per cent may be determined by alligation or any other suitable method; if the charge is made by per cent, the calculation will be as in the table above.

"Sulphur is estimated in a similar manner, the per cents taken from the analysis card, the brand and pile number being stated as follows:

CALCULATION OF SULPHUR.

		Sulphur.		Mixture.			
Pig (Pile or brand)	No. 1	0.025 per cent	x	40 per cent	=	0.01000 %
" "	No. 2	.033 "	x	10 "	=	.00330 "
" "	No. 3	.045 "	x	05 "	=	.00225 "
Home scrap etc		.060 "	x	30 "	=	.01850 "
Foreign scrap		.095 "	x	15 "	=	.01425 "
			100.00	"	=	.04780
Gain from Coke					=	.030
Sulphur in castings					=	0.0778 %

"As an example in a cylinder mix, we may take the following:

		Silicon.		Amount in mixture.		Units.
Pig (Brand)	No. 1	2.20 per cent	x	700 lbs.	=	1540.00
" "	No. 2	1.72 "	x	1,350 "	=	2322.00
" "	No. 3	1.03 "	x	500 "	=	515.00
Steel Scrap (Rails)		.05 "	x	450 "	=	22.50
			3,000	"	=	4,399.50
1 lb. (4,399.50 ÷ 3,000)					=	1.47 % Sil.
Loss					=	.15
Silicon in cylinder					=	1.32

"Sulphur is calculated in a similar manner. Steel rails generally run 0.095 per cent sulphur.

"The steel rail used in a cylinder mixture is employed to produce a close grained iron. For cylinders meant to be used under very high pressure, the steel may be increased to 25 per cent. In using steel scrap, it becomes necessary to watch the sulphur very closely. I give the following example of calculation:

CALCULATION OF SULPHUR IN A CYLINDER MIXTURE.

		Sulphur.		Mixture.		Units. Sulphur.
Pig (Brand)	No. 1	0.012	x	700 lbs.	=	11.900
" "	No. 2	.028	x	1,350 "	=	37.800
" "	No. 3	.042	x	500 "	=	21.000
Steel rail		.095	x	450 "	=	42.950
				3,000 "	=	113.650
				1 lb.	=	0.03788
Gain from Coke					=	.030
Castings will contain						0.068 Sul.

"In the purchase of coke, we reject any car showing, on analysis, more than 0.75 per cent of sulphur.

"In mixing iron by analysis the castings run very uniform. Foundrymen, as a rule, expect the castings to show on analysis the exact per cents figured in the mix. This is an impossibility, as the fuel, the flux, the sampling and weighing are liable to variation. Yet if the work is carefully done the castings should not vary more than 0.50 per cent—generally much less—after the founder gets accustomed to the method."

In the statement given from a stove foundry in last week's issue, as to the limit put upon the metalloids in its mixture, the maximum sulphur content was given as .09 per cent. This was an error in the types. The sulphur percentage should have been .03.

THE Crocker-Wheeler Electric Co. has announced the establishment of a Western office at rooms 1514 and 1516 "Old Colony" Bldg., Chicago, for the conduct of its business as manufacturer of electrical machinery and electrical engineering. Mr. C. H. Wilmerding, consulting engineer, has accepted the position of manager of the Western office of this company, and will conduct the business in the future with the assistance of Mr. Julian Roe, who will act as salesman. The Western office has connected with it a competent construction force, sufficient to take care of any construction work that may come up. In consequence of this arrangement, customers of the company will have the advantage of dealing with the company itself and of obtaining direct benefit of its engineering ability. Mr. Wilmerding has had considerable experience in business in Chicago, and will undoubtedly be able to secure for his company a large part of the business that is to be had in the West.

AN attempt is being made to organize the men employed at the tin plate plant of Wallace, Banfield & Co., Irondale, O., into a lodge of the Amalgamated Association. Two meetings have already been held addressed by officials of that organization. The company will not employ members of the union, and it is hardly thought the present move will succeed.

INCREASING USE OF SEMI-STEEL.

For several years past semi-steel has been made by various concerns throughout the country, and it has been found to be of very great value for certain purposes, taking the place of castings made of steel in a good many cases. One of the best known companies in Chicago, the King & Andrews Co., has been experimenting for some time on semi-steel, and is now making castings of this metal for the trade. The King & Andrews Co. has formed, for the purpose of handling this branch of its business, the Semi-Steel Co. This company says that the basis of semi-steel is low carbon steel, which is used in combination with special irons that will insure strength and toughness, the resultant mixture being treated with an alloy which renders the castings homogeneous and solid. The castings thus obtained have twice the strength and elasticity of cast iron, and can be used in 75 per cent of the work for which steel castings are ordinarily employed. A tensile strength of over 63,000 pounds per square inch has been obtained from special mixtures, but the average is about 40,000 pounds.

The advantages claimed over steel castings are thus stated by the manufacturers: The cost is about half that of steel castings; deliveries can be made within two or three days of the receipt of the patterns, and the metal is free from blow holes and pin holes. It is also claimed that semi-steel has special value in such work as requires great strength and toughness, as, for instance, gearing, clutches, cross heads, press frames, plungers, rocker arms and the general run of machinery castings. A special mixture, known as acid metal, has proved valuable for castings used in chemical and smelting and refining works. These comprise pans and stills for the concentration of acids, heavy caustic pots for alkali works, desilvering and lead kettles, slag pots, ingot molds, etc.

The demand for semi-steel castings has increased very largely in the past year, and the present time the King & Andrews Co. finds that its capacity is very much too small for the work it is called upon to do, and consequently the company is making arrangements for an enlargement of its plant, and in fact has already commenced upon the work of increasing its capacity. The floor space of the foundry is to be increased considerably and the roof raised. The tools at present in use are to be added to, and when the work of increasing the capacity is completed, the foundry will be able to turn out nearly twice as much work in a given time as at present. Among other tools to be added is a 40-ton crane, built by the Coal Handling Machinery Co., of Chicago, the same company having furnished the King & Andrews Co. with a 20-ton crane lately, which has worked very satisfactorily.

Personal.

John M. Mulrooney, editor of the *Marine Review*, Cleveland, has just returned from a trip to England to attend the congress of naval architects and marine engineers held in London early in July. Mr. Mulrooney found not a little interest in engineering circles in England in the possibilities of increasing exports of American steel, and evidence of a desire to be better assured than English manufacturers are at present, that they will not be affected thereby. With all the impressiveness of great and historic shipbuilding plants visited, which represent the accumulated experience and resources of centuries, Mr. Mulrooney did not find that they were better equipped for their work than are the representative shipyards on the Great Lakes. In respect to machinery they are not in all cases thoroughly up to date. The visitors did not find reason for believing that greater economies are attained today in vessel-building in England than are possible to the best equipped plants in the United States.

William H. Conley, of Riter & Conley, the well-known constructing engineers of Pittsburg, died on July 25 from congestion of the lungs. Mr. Conley was 57 years of age and was a native of Pittsburg. He learned the printer's trade but later went into mercantile pursuits and ultimately became connected with Frank Riter, with whom he afterwards entered into partnership.

Chas. Davis, president of the Davis & Egan Machine Tool Co., Cincinnati, is home from a European trip. He says that American superintendents, foremen and workmen are all through Europe, getting 50 per cent more wages than they received here. He adds: "We are sending a couple of men from our works next week who will receive in Germany, as a starter, $24 per week, as against $15 here."

Chas. S. Simpson, of Florence, Wis., has become connected with the Lake Superior Consolidated Iron Mines as mining engineer, and will make Duluth his headquarters.

Capt. A. E. Hunt, of the Pittsburg Reduction Co., sails for Europe this week.

Received from the Trade.

The Charter Gas Engine Co., Sterling, Ill., in its latest circular, gives letters from two or three scores of printing establishments in which the Charter gas or gasoline engine has been in use, with good results as to economy and efficiency.

The Fulton Steam Boiler Works, Richmond, Ind., is now an incorporated company, with John T. Caulfield, president, and Thos. R. McDonnell, secretary. The Fulton Steam Boiler Works & Foundry, John T. Caulfield, proprietor, announces in a circular that the plant and business have been transferred to the new company, which has a capital stock of $85 000. No change will be made in the working management. The increase of capital, it is expected, will permit of taking better care of the trade and increasing the business of the concern.

James Leffel & Co., Springfield, O., have issued a neat new pamphlet, "D," with numerous illustrations and descriptions of the throttling and automatic engines, with portable and stationary boilers, which they are building in a variety of sizes and styles. A copy is sent free to those interested, on application to the company.

The Inland Steel Co., Chicago Heights, Ill., much of whose raw material is old steel rails, which it works into agricultural shapes, gives illustrations of its principal products in a cloth-bound booklet of 42 pages, just issued. Plow beams, cultivator arches, harrow teeth and light T rails are among the company's specialties.

The Estate of P. D. Beckwith, Dowagiac, Mich., has just issued its "Year Book of the Round Oak Family" for 1897, containing full descriptions of the heaters, ranges and furnaces made by this concern.

No Bids for Armor Plate.

Secretary Long has received replies from the Carnegie and the Bethlehem companies to his invitation to submit bids for supplying armor for the three battleships, Illinois, Wisconsin and Alabama, in accordance with the limitation placed by Congress upon the price to be paid for the armor. Both companies decline to bid within the $300 limit on the ground that it is not possible for them to produce armor of the quality they have been supplying to the Government at that figure. The Carnegie company makes an offer which it is understood the Bethlehem concern is also willing to repeat, to supply the diagonal armor for the three battleships at a price to be fixed by the Navy Department at its pleasure. This offer is made in order that the work on the ships shall not be entirely stopped by the failure to procure armor. The ship builders, if this is done, will be able to go on with their work until the ships are afloat, inasmuch as the diagonal armor, or that constituting the bulkheads, is all of the armor that is built into the ship's structure. The amount of such armor will not exceed 80 tons for each ship, a very small proportion of the total supply required, but as it is regarded as essential the Secretary probably will accept the tender.

THE first of the finishing scales to be adjusted for 1897-98 was at the American Iron & Steel Works, Pittsburg, where, after numerous conferences, an agreement was reached last week. The terms of the settlement are not disclosed but are understood to be in substance the scale originally presented by the company, a reduction of about 15 per cent for finishing mills. During the year improved machinery has been installed in almost every department, effecting a radical change in tonnage output, and readjustment is consequnently the main feature of the scale. Certain schedules however have been lowered and the reduction in these departments are from 10 to 15 per cent. The scale was accepted by the workers' committee and all departments of the entire plant are in operation. The Soho furnace recently acquired by Laughlin & Co. will be blown in in a few days and will furnish Bessemer iron to Jones & Laughlins, Ltd.

BAR AND SHAFTING TURNING MACHINE.

An improved machine for turning bars and shafting has been devised by Jacob Fitz, of Hanover, Pa., and we present three illustrations which will suffice to indicate its characteristic features. Fig. 1 is a vertical longitudinal section. Fig. 2 is a cross-section on the line 3—3 of Fig. 1. Fig. 3 is a face view of the cutter-head, with the tool-clamping ring and the adjusting band removed. The carriers B are supported on the ways and slide along them. D is the shaft to be turned. The feed-screw F is turned by gearing at *f* and is engaged by the sections of a split nut G on the carrier B. These sections, through the eccentric lever G′ may be adjusted in and out of mesh with the feed-screw, throwing the carrier quickly into or out of operation. The head H may be arranged to turn, as shown, or may be used stationary and put on the ordinary lathe carriage, in which case the shaft might be on centers and be turned in the usual manner. The head is provided with the body I, having a tubular stem *i*, which fits and turns in the bearings *j* of the stands J. These stands also have bearings *j*′ for the back shaft J′, which is geared at J^2 with the tubular stem of the body I, to turn the head when the back shaft is operated, which may be accomplished by any desired connection with the power. The tubular stem *i* is geared at *f* with the feed-screw F, so the latter is operated as the turning head is revolved. To the body I is held the face-plate K, which has a threaded seat *k* near its outer edge, and to this face-plate is held the tool-holder L, having ways L′ for the tools M. At their outer ends the tools M are pressed upon by individual blocks N, the outer ends of which are beveled at *n* and are pressed upon by the adjusting-band O, whose inner edge is beveled at O′ to bear upon the blocks N, while its outer edge is threaded and turns into the threaded seat of the face-plate, so the adjusting band as it is turned into the face plate will force the tools into the desired position. When the tools have been adjusted as desired, they may be held by the clamping-ring P, which bears against the tools and is bolted to the tool-holder L or is otherwise securely held. The tools M may be of any suitable turning pattern and, as the head is revolved, will operate to turn the bar or shaft to the desired form, the bar being carried through the cutting-head by the feeding carriers. At the ends of the tubular stem are provided removable bushings Q, held by keys or pins *q*. These bushings turn with the stem and form guides for the shaft and may be removed and replaced by others to adapt the machine to larger or smaller rods.

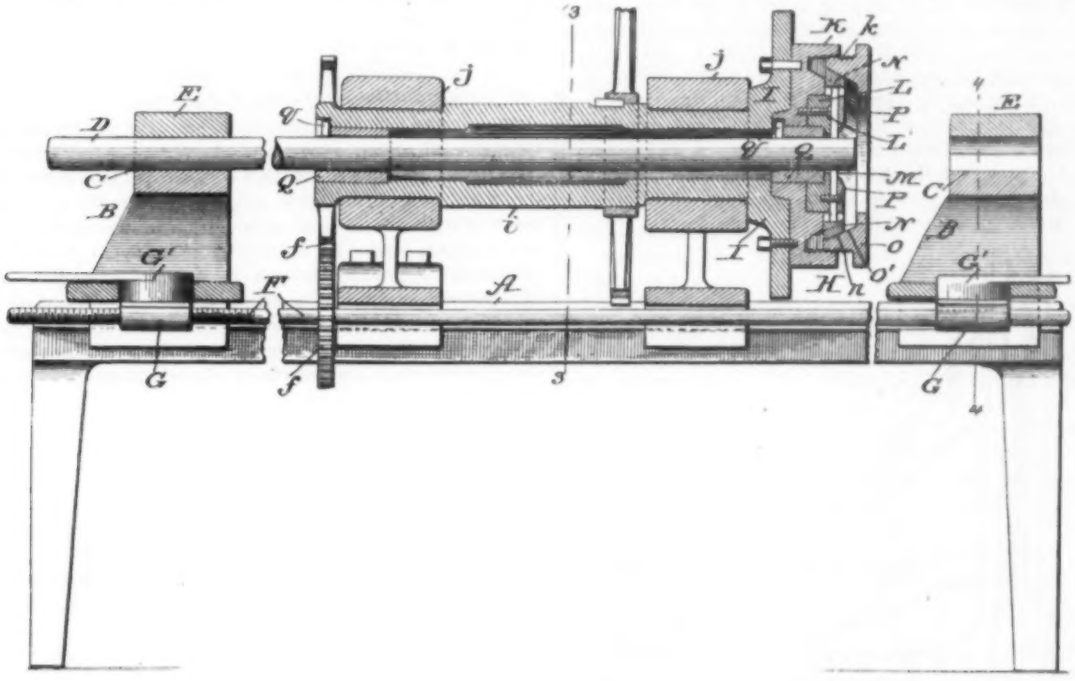


FIG. 1.

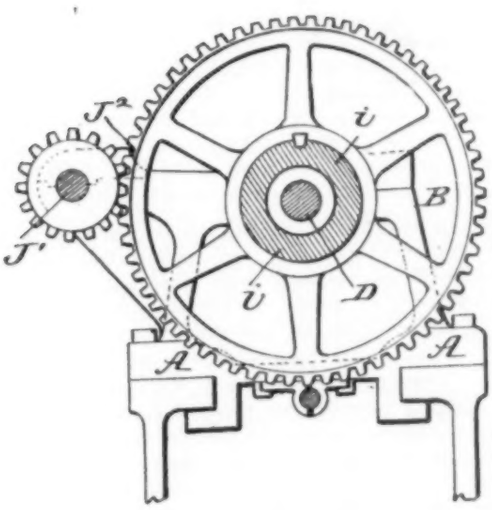


FIG. 2.

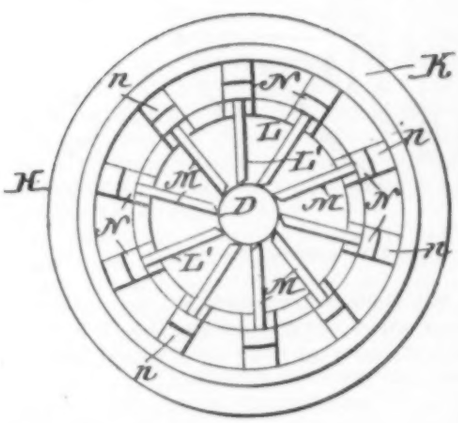
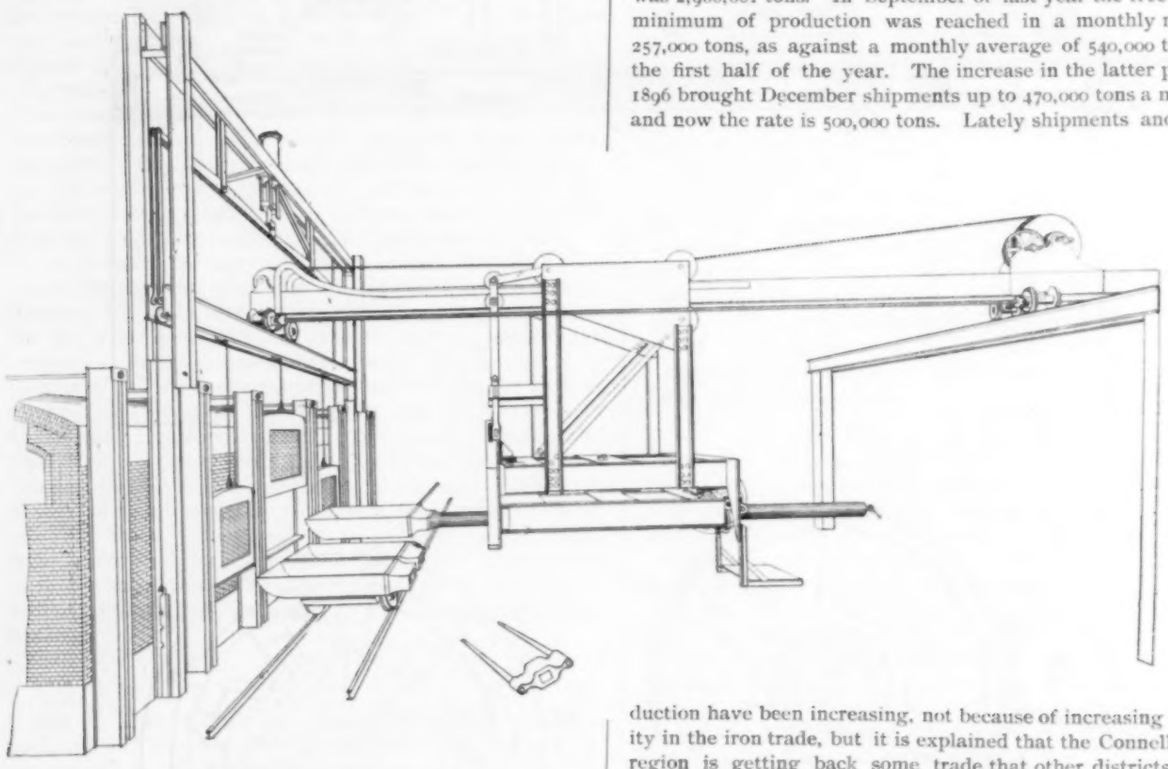


FIG. 3.

The high rate of speed attained on this machine is a feature that insures economy in operation. While turning is ordinarily one of the most costly operations in the production of shafting, it is claimed that with the machine illustrated turning is less expensive than straightening, finishing or dressing the ends. Doing away with the expense of centering eliminates one considerable element of cost.

THE ECK CHARGING MACHINE.

A charging machine for open-hearth furnaces has been designed by Joseph P. Eck, of Muncie, Ind., and is illustrated in the accompanying cut as now in operation at the open hearth plant of the Midland Steel Co., of Muncie. As shown, the framework of the machine consists of two girders, which with appropriate tracks, rest on a stationary track in the rear and on a lifting track in front. The track at the furnace end of the machine is connected to the outer ends of two levers, the other ends of which are actuated by the plunger of a hydraulic cylinder located centrally over the furnace front. By this arrangement the doors, as well as the front portion of the machine are raised. The door may be instantly connected or disconnected and one or all may be lifted at one time. On the rear portion of the carriage is a hydraulic cylinder, connected with the carriage by suitable mechanism, and from which the carriage derives its motion. The lower portion of the carriage, on which is supported the charging bar, is equipped to give side motion to the latter, for the proper distribution of stock immediately within the door, as well as for the exact adjustment of the bar in connecting with the pans containing stock, or in picking up heavy stock with forks. This side motion is controlled by a worm gear in the rear,



THE ECK CHARGING MACHINE.

operated by a man stationed on a stand attached to the machine. This man and a boy who operates jacks to give the carriage forward or backward motion, are all the labor required in the manipulation of the machine.

The stock to be charged is brought to the furnaces in pans on trucks which run on tracks laid in front of the furnaces on the charging side. The carriage is brought forward by the manipulation of the jacks and, if necessary, the machine may be raised to the proper height by means of the overhead cylinder. A hand wheel permits of turning the charging bar to either side, as it enters the furnace, and this side swing enables the operator to distribute stock over the furnace bed for a length of 10 to 12 feet, so that the furnace is not blocked in front of the door. The charging bar is a hollow shaft with heavy walls. Within is a small shaft turned by a hand wheel at the rear end of the bar. At the other end is a latch and at the turning of the hand wheel it is inserted and locked in the casting on the pan or forks containing stock. The dumping of stock in the furnace is automatic.

The capacity of the machine now in use at Muncie is four tons. It charges a 40-ton furnace in less than an hour. Any size of machine may be constructed from one serving a 10-ton furnace up to one adapted to furnaces of the largest size built.

Farmers Paying off Mortgages.

Farmers in Illinois and the Middle West are making money and paying off their mortgages. That is the testimony of Chicago men who loan millions of dollars on Western farms. From reliable reports that are based on figures and not on political sentiment it is very evident that the farmer is making more money than the men engaged in mercantile and manufacturing pursuits. One Chicago firm reports that 60 per cent of the mortgages placed by his firm are paid off when due, while another declares that his company has not foreclosed on a farm in Illinois, although it has loaned $8,000,000 on farms in this State. The conditions in Iowa and Wisconsin are almost as favorable.—[Chicago Times-Herald.

Connellsville Coke, First Half of 1897.

The statement of coke shipments and production in the Connellsville region, as given by the *Courier*, for the first half of the year indicate a business of 6,000,000 tons for 1897. In the first half of 1896 the shipments were about 3¼ million tons. For the six months ending June 30, this year, the total was 2,968,681 tons. In September of last year the free-silver minimum of production was reached in a monthly rate of 257,000 tons, as against a monthly average of 540,000 tons in the first half of the year. The increase in the latter part of 1896 brought December shipments up to 470,000 tons a month, and now the rate is 500,000 tons. Lately shipments and production have been increasing, not because of increasing activity in the iron trade, but it is explained that the Connellsville region is getting back some trade that other districts have been having for a time. In the week ending July 10, production was about 120,000 tons and shipments were 107,918 tons.

Prospective Increase in Pig Iron Production.

Judging from reports received by the American Iron and Steel Association from furnaces in various parts of the country, the next month or two will show a further increase in pig iron production. The resumptions indicated in these reports are the following: Steelton Furnace, Columbus, O. (new), July 26; Bessie Furnace, New Straitsville, O., Aug. 13; third furnace of the Ashland Coal & Iron Railway Co., Ashland, Ky., this fall; Hecla Iron & Mining Co., Hecla, O., Oct. 1; Hinkle Furnace, Ashland, Wis., Oct. 1; North Western Iron Co., Milwaukee, Aug. 1; Sligo Furnace, Sligo, Mo., Aug. 1; Spearman Furnace, Sharpsville, Pa., Sept. 1; Punxsutawney Iron Co., Punxsutawney, Pa., Aug. 1; Allentown Iron Co., Allentown, Pa., Aug. 1; Weston Furnace, Manistique, July 26; Lawrence Furnace, Culbertson, O., Sept. 1; Tod Furnace, Youngstown, O., July 25; Star Furnace, Jackson, O., Sept. 1; Struthers Furnace, Struthers, O., Aug. 15; Excelsior Furnace, Ishpeming, Mich., early in August; Clinton Iron & Steel Co., Pittsburg, Aug. 1; Everett Furnace, Everett, Pa., Aug. 1.

Meantime few furnaces are stopping or planning to stop.

THE WESTERN FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, July 21, 1897, at the Great Northern Hotel, Chicago. The president, C. A. Sercomb, occupied the chair. The following members were present: C. A. Sercomb, Schwab & Sercomb, Milwaukee, Wis.; J. T. Rowlands, J. I. Case Threshing Machine Co. Racine, Wis.; W. N. Moore, Joliet Stove Works, Joliet, Ill.; O. J. Colton, F. M. Lyons, Burlington Route Foundry, Aurora, Ill.; G. H. Carver, J. Ott, Plano Mfg. Co., West Pullman, Ill.; O. T. Stantial, W. L. Lukens, Illinois Malleable Iron Co.; James Frake; Wm. Ferguson, Gates Iron Works; C. H. Hopke, Western Foundry Co.; A. Sorge, Jr., M. E.; H. S. Vrooman; W. L. Thompson, Link Belt Machinery Co.; R. C. Barr, R. J. Cleveland, Cleveland & Barr; J. H. Agnew, E. W. Smith, Crane Co.; D. Truesdale, Cribben & Sexton Co.; F. A. Young, Jos. Dixon Crucible Co.; A. H. R. Atwood, Monon Route; P. D. Sloane, Garden City Sand Co.; H. F. Frohman, S. Obermayer Co.; H. W. Carter, all of Chicago; and S. T. Johnston, F. A. Rundle, Whiting Foundry Equipment Co., Harvey, Ill.

The secretary reported that at the last meeting of the board of directors a motion was made that the name of Thomas D. West be presented at the next meeting of the association for honorary membership. On motion duly made and seconded Mr. West was unanimously elected an honorary member.

A paper on "Foundry Facings," by H. F. Frohman, was then read by the secretary. It is given on another page.

Discussion.

Mr. Carver: There is a gentleman here who, I believe, makes the best castings that are made in the Northwest, and I would like to hear from him and have him tell us what kind of facings he uses, and how it is he gets such good results and such good stove plate castings. The gentleman is Mr. Moore, of the Joliet Stove Works.

Mr. Moore: The orator rather embarrasses me with compliments. I think that he rather overestimates the quality of work that we turn out, and I can assure you that what we do not know about the facing matter would be a very long story. The facings that are used in stove foundries now are generally plumbago and what are known as "heavy facings," the composition of which I really do not know. The writer of the paper could have told a great many things in that connection that he knows and that I do not. It is a mistake, however, to say that the best stove-plate castings are made with plumbago. The best stove-plate castings that are made in this country are made east of the Hudson River, and it has been so for a generation or two and there is not very much change. The heavy facing that is used in the New England foundries is German lead, and that is used in very small quantities in the West. The difficulty is in the use of it, and it seems to take an educated lot of workmen to manipulate it. The New England molders have been brought up to use German lead and they do use it and make the best castings that are made in this country. They also use some Rhode Island lead. The great difficulty in using these facings, where the molders have not been brought up to use them, is in their stickiness. We treat different castings differently. We use some Rhode Island lead. We use some plumbago; and we find that fine charcoal makes very satisfactory returns on most of the heavy facings. We also use considerable soapstone. Stove-plate castings are made better than machinery castings, not because the foundry is better than the machinery foundry, but because all of the surrounding circumstances permit it. The sand that is used, the skill of the workman, and the various conditions that surround the work.

I would be very glad to answer any questions in detail, so far as I am able, as to how good castings are made so far as we know how to make them. We think our castings are subject to great improvement. That is our own judgment, and we would like to learn how to make them better. It is true that a great deal more plumbago is being used on stove plates than was the case five or ten years ago, and for some kinds of plate it answers the purpose better than any hing else. We meet with some conditions in stove plate castings that are not met in other castings. One is the flat gate and the difficulty of preventing cutting underneath. It takes good sand and good molding, etc., to prevent it. I wish I could give you more detailed information as to how it is done.

Mr. Carver: Mr. Moore speaks of using a heavy facing and topping off with a lighter. What does he mean by a heavy facing? Sea coal facing? And what does he mean by the lighter facing?

Mr. Moore: We do not use sea coal facings at all on stove-plate. The heavy facing is either a mineral, which is sometimes an anthracite, or a combination of black lead and other things that are hardly rated in the paper. Each facing manufacturer has his own brand of heavy stove-plate facing. That is the first facing that is shaken on, and the return facing is a facing of charcoal and other material, or charcoal alone put over the heavy facing for the purpose of making the printed back of the pattern. Without charcoal the pattern would pick up the sand from the mold. But the castings are not all made the same way. In fact I think if one were to walk through a stove shop and see the various practices in which facing is used, and ask either the molders or the foreman to tell him why those things are done, he would be unable to get a satisfactory answer. One molder gets the desired result working one way, and another another way.

Mr. Truesdale: I take the ground that all facings are bad. There is no such thing as a good facing. The coming foundryman will not use facings as we use them now. I am making castings for bath tubs, and have been for over a year, without a grain of facing of any kind, and I am making better castings than I find where they are using plumbago. I do it by the use of silica sand. The time is coming when facing men will have to get into some other line of business. I have had a good deal of experience in using facings, and there is so much difficulty in training men to use them properly with any degree of judgment. A molder comes into the shop some damp, rainy morning, and turns his pattern out and it sticks. It is all the fault of the facing, in his estimation. It never appears to him that the conditions are different. When I first came to Chicago I found them using facings on bath tubs. The men are not used to facings and, bath tubs have to have a nice enamel. I watched these fellows, who were almost all machinery molders, and not accustomed to the nice use of facings. They stuck it on with trowels. There were forty places where the facing was rough. The facing was good but it was not properly handled. I have abandoned the use of facings completely and am now making better castings. I have made better work without facings than I made with them.

Mr. Ott: I have had some little experience in the use of facings. I have had my ups and downs. I feel the same as Mr. Truesdale, and I hope the time is coming when we can do without facings. I think the fault is in the molder more than in the facings. I have not had much experience in stove plate castings. I have worked in stove-plate shops, but not in connection with the facing.

Mr. Rowlands: I can say that I have seen many times when I was very glad to have a facing. If I want to use a pattern with a real nice figure I never put on a facing. I take charcoal and shake it on the pattern. I never face it afterward. My attention was called to that in Dubuque, Ia. We made some of the finest light castings I ever saw in my life. All they use in the world there is a little coarse charcoal shaken on the face of the pattern. They also use it in the place of parting sand in the mold. The result is that they do not have to mold their cast ing over 15 minutes and the figure is nice, bright and sharp. I think it is a good deal of a farce to use high-priced facings.

Mr. Truesdale: I am accustomed to making light castings. I did not mean that the time was coming when we could make castings of 20 tons without facings. I was speaking of light castings. Let me mention another difficulty in the use of facings. You get the best grade of facing—what is known as Rhode Island facing—and put it in your facing box. Some fellow does not grease his pattern and it sticks. He conceives the idea of putting some return facing in with the heavy facing, or if he happens to have any soapstone around he puts in soapstone. Bill sees Jim, and he thinks it is a good thing; and Tom puts in a little more, and the first thing you know you have a mixture. You cannot catch them at it, either.

Mr. Ferguson: I think the good and bad facing depends upon the manipulation of it. I can remember when we did not have a great variety of facings for the different kinds of work and we had to use blacking. I must say I have seen as beautiful castings made in loam with charcoal as I have seen with any other kind of facing. I cannot conceive of the time when we will make castings without the use of any facings. It may be that we will be able to get material that will answer the purpose. It would be a blessing if we could. The great trouble is with the mechanics that have to use it. They will use it 1 to 12 when they should use it 1 to 8. They do not use any judgment. One molder will bring out a fine piece of work and the one beside him will bring out a piece that you do not like to look at.

On motion the association extended a vote of thanks to Mr. Frohman for his excellent paper.

James Frake, as chairman of the Committee on Apprenticeship, then submitted the following report:

To the President and Members of the Western Foundrymen's Association.

Your committee to revise the various reports of the committee on apprenticeship, and to present a report giving the legal forms of indenture which it would be advisable to adopt in each class, begs to report that it has carefully considered the matter, and herewith presents to the association the following forms of indenture:

INDENTURE FOR MACHINERY MOLDER'S APPRENTICE.

This Agreement, Made and entered into this..... day of.....A. D. 189..., between..... .....and.....doing business under the firm name of .....and.....(or..... a corporation organized under the laws of the State of..... .....), of the City of....., County of.....and State of..... part.....of the first part, and....., a minor, and.....his father (or his mother or guardian), parties.....of the second part.

This Indenture Witnesseth, That the said part.....of the first part, agree... to take.....a minor, the first named party of the second part, into.....employ and service, for the period of four years from the date hereof, for the purpose of teaching the trade of iron molder to the said....., minor, as carried on in..... works, in the manner hereinafter specified.

And the said.....minor, the first-named party of the second part, covenants and agrees that he will faithfully, honestly and industriously work and serve for said period in such capacity as the foreman may from time to time direct, and that he will obey all rules and regulations in vogue in said works, and will not absent himself from the service of the said part.....of the first part without leave, unless in case of sickness, and further covenants and agrees to abstain from the use of intoxicating liquors and tobacco during the said term of apprenticeship.

The said....., minor, further agrees and covenants that he will faithfully perform the work assigned him, which is as follows, but which may be deviated from so long as it does not impair the apprentice's opportunity to learn the trade thoroughly:

The first year he shall work in the core room, and learn the making and using of cores, and how to care for the core boxes and tools; the second year he shall work at light molding of various kinds, and to assist in the care of patterns, and help molders as occasion may require; the third year he shall do a heavier and more difficult class of molding as fast as he may prove himself capable; and the first nine months of the fourth year he shall work on the best class of work in the shop, whether made in dry or green sand, and the last three months of his term shall be spent in working at the cupola, in order to gain some knowledge of the melting and mixing of irons, and to learn to care for the cupola and ladles.

The said....., minor, agrees to make up all time lost by him whether by sickness or absence each year before he commences on the following year.

The said part.....of the first part, covenant...and agree... to teach, or cause said apprentice to be taught or instructed in the art or trade, which he is apprenticed to learn.

The said part.....of the first part further agree...to pay unto the said....., minor, for services rendered while learning his trade: For the first year, four dollars per week; for the second year, five dollars per week; for the third year, six dollars per week, and for the fourth year, seven dollars per week, and an additional bonus of ten dollars at the end of the first year, twenty dollars at the end of the second year, thirty dollars at the end of the third year, and forty dollars at the end of the fourth year of his apprenticeship, it being understood that the payment of these bonuses is optional on the part of the part.....of the first part, and shall only be paid when the first party is satisfied that the apprentice has faithfully performed all requirements.

If the said....., minor, shall work an additional year on loam work, the part.....of the first part shall pay unto him the sum of eight dollars per week, and a bonus of fifty dollars at the end of the said additional year on the conditions named above for the previous years.

The said....., father (or mother or guardian of said minor, covenants and agrees that the..... minor shall faithfully perform and observe all of the covenants and stipulations which he has herein covenanted and agreed to do.

In Witness Whereof the said parties have hereunto affixed their hands and seals the day and year first above written.

.....[Seal.]
.....[Seal.]
.....[Seal.]

INDENTURE FOR STOVE-PLATE AND AGRICULTURAL MACHINE APPRENTICE.

This Agreement, Made and entered into this..... day of.....A. D. 189..., between..... .....and....., doing business under the firm name of..... .....(or..... , a corporation organized under the laws of the State of..... .....) of the City of....., County of..... and State of....., part.....of the first part, and ....., a minor, and ....., his father (or his mother or guardian), parties.....of the second part.

This Indenture Witnesseth, That the part.....of the first part, agree... to take..... ..... minor, the first-named party of the second part, into.....employ and service, for the period of three years from the date hereof, for the purpose of teaching the trade of iron molder to said ....., minor, as carried on in..... works, in the manner hereinafter specified.

And the said....., minor, the first-named party of the second part, covenants and agrees that he will faithfully, honestly and industriously work and serve for said period in such capacity as the foreman may from time to time direct, and that he will obey all rules and regulations in vogue in said works, and will not absent himself from the service of the said part.....of the first part without leave, unless in case of sickness, and further covenants and agrees to abstain from the use of intoxicating liquors and tobacco during the said term of apprenticeship.

The said....., minor, further agrees and covenants that he will faithfully perform the work assigned him , which is as follows, but which may be deviated from so long as it does not impair the apprentice's opportunity to learn the trade thoroughly:

First six (6) months day work, to be spent intaking care of patterns and coreboxes. Second six (6) months in the care of cupolas, ladles and flasks, so as to become familiar with their use before starting to mold. Second year to start at the more simple class of work, and the more difficult pieces of work to be given him as fast as he proves himself competent. Third year to be spent on the most difficult class of work.

The said....., minor, agrees to make up all time lost by him whether by sickness or absence each year before he commences on the following year.

The said part.....of the first part, covenants and agrees to teach, or cause to be taught, said apprentice in the art and trade which he is apprenticed to learn.

The said part.....of the first part further agree... to pay said....., minor, for services rendered while learning his trade for the first year, $5 per week, day work; second year, board prices, less 15 per cent piece-work; third year, board prices, less 10 per cent piece-work; and a bonus of $10 for extra efficiency at the end of the second year, and $20 at the end of the apprenticeship; the payment of bonuses being optional with the party of the first part, when he is thoroughly satisfied that the party of the second part has faithfully performed all requirements.

The said....., father (or mother or guardian) of said minor, covenants and agrees that the said..... ....., minor, shall faithfully perform and observe all of the covenants and stipulations which he has herein covenanted and agreed to do.

In Witness Whereof the said parties have hereunto affixed their hands and seals the day and year first above written.

.....[Seal.]
.....[Seal.]
.....[Seal.]

INDENTURE FOR BENCH AND BRASS MOLDER'S APPRENTICE.

This Agreement, Made and entered into this ..... day of.....A. D. 189...,between..... and....., doing business under the firm name of.....(or..... a corporation organized under the laws of the State of..... .....) of the City of....., County of.....and State of....., part..... of the first part, and.....a minor, and ..... his father (or his mother or guardian), parties.....of the second part.

This Indenture Witnesseth, That the said part.....of the first part, agree...to take....., a minor, the first-named party of the second part, into.....employ and service, for the period of two years from the date hereof, for the purpose of teaching the trade of molder to said..... ....., minor, as carried on in.....works, in the manner hereinafter specified.

And the said....., minor the first-named

party of the second part, covenants and agrees that he will faithfully, honestly and industriously work and serve for the said period in such capacity as the foreman may from time to time direct, and that he will obey all rules and regulations in vogue in said works, and will not absent himself from the service of the said part.....of the first part without leave, unless in case of sickness, and further covenants and agrees to abstain from the use of intoxicating liquors and tobacco during said term of apprenticeship.

The said....., minor, further agrees and covenants that he will faithfully perform the work assigned him, which is as follows, but which may be deviated from so long as it does not impair the apprentice's opportunity to learn the trade thoroughly.

The first six months to be spent in taking care of cupola and ladles, and doing general labor, so as to become familiar with his surroundings. Balance of apprenticeship to be devoted to molding entirely, and to be given charge of work, and a better class of it as fast as he becomes proficient.

The said..... ....., minor, agrees to make up all time lost by him whether by sickness or absence each year before he commences on the following year.

The said part.....of the first part, covenant... and agree... to teach, or cause said apprentice to be taught or instructed in the art or trade, which he is apprenticed to learn.

The said part.....of the first part further agree... to pay unto the said..... ....., minor, for services rendered while learning his trade: For the first year, $6 per week, and for the second year $8 per week, if day-work prevails. Where piece-work is the rule: $6 per week for the first six months; board price less 20 per cent for the second six months; and board price less 15 per cent for the balance of the term, and upon proper and satisfactory completion of the term, a bonus of $10 at the end of the first year and $20 at the end of the second year shall be added to above, the giving of which is optional with the part.....of the first part.

The said.. ....., father (or mother or guardian) of said minor, covenants and agrees that the said....., minor, shall faithfully perform and observe all of the covenants and stipulations which he has herein covenanted and agreed to do.

In Witness Whereof the said parties have hereunto affixed their hands and seals the day and year first above written.

.....[Seal.]
.....[Seal.]
.....[Seal.]

Respectfully submitted,

James Frake,
William Ferguson,
Henry W. Carter,
} Committee.

The following resolution was adopted: That the report of the Committee on Apprenticeship be adopted and that the indentures be embodied in the proceedings of this meeting, and an extra two hundred copies of these proceedings be printed ready for distribution.

The secretary then read the following letter:

Room A, Chamber of Commerce.
Cincinnati, O., July 13, 1897.

Mr. A. Sorge, Jr.,

Secretary Western Foundrymen's Association.

Dear Sir: We have the honor to advise you that at a meeting of the foundrymen and affiliated interests, which was held in this city to-day, it was resolved to extend to the Western Foundrymen's Association a cordial invitation to hold its October meeting in Cincinnati.

The undersigned were appointed a committee to convey to you the assurance that the citizens of Cincinnati will feel honored by your presence.

Reasonable hotel rates will be secured for you, and a commodious room for your meetings provided free of any expense to your association.

Kindly present this invitation to your executive committee at its next meeting, and advise our chairman at your earliest convenience of its action. Should this invitation be accepted, we will thank you to furnish us as early as possible the most accurate obtainable information touching the number of members who will be in attendance upon this convention. We take it that you will take care of the matter of special railway transportation.

Very truly yours,

Geo. McG. Morris, Chairman.
Henry Gossiger, D. B. Meacham,
Lincoln Haney, W. J. Breed,
T. L. Griffith, Jas. M. Gamble,
J. D. Smith.

On motion duly seconded, the invitation was accepted and it was left to the executive committee to arrange the plans.

The meeting then adjourned to partake of a light collation.

FOUNDRY FACINGS.*

BY H. F. FROHMAN.

Something is needed in a foundry that will prevent the sand of the mold from being burned by the molten metal, that will cause the castings to "peel" readily, that will deliver the castings "smooth," from the mold with a "slick" surface and a bright color, something that will neither run nor burn away before the molten metal at the time of pouring; something that will adhere to the surface of the mold and "part" and "peel" the sand well when the casting is to be shaken out; something of such a nature that it can be smoothed or slicked in the finishing of a mold. This something we term a foundry facing—a material of a very refractory nature that will stand any amount of heat (more than the temperature of the molten metal). I fully understand that all facings are not necessarily to be slicked. Some facings are only to be dusted on the mold, but I am now speaking generally of the requirements of a good facing. The something that will do all this is carbon (in some chemical form or other), of a very refractory nature, that will stand any amount of heat. Before I proceed, please understand me that facings are not cures of all evils and ills in a foundry, for good sands as well as good molders and the use of good common sense are as essential as good facings and blackings. These latter merely assist the former.

The most common facing (which is a misnomer as it should be termed a "mixer") is sea coal or coal facing. This is used in almost every foundry. This is the only facing known which is *not* put on the face of the mold, but is mixed with the sand in the proportions of one shovel full of coal to 10 or 20 shovels full of sand, according to the size and weight of the casting to be made. This sea coal or crushed coal is mixed with the sand nearest to the surface of the mold, in order to "rot," or in other words to break up, the particles of sand, so that when the molten metal comes into the mold, in its heated state, it does not fuse the sand to a hard mass similar to glass, but allows the sea coal to burn away and leaves the sand in a separated condition, so that when the casting is cooled off, these particles of sand will separate and drop off. Perhaps I do not make myself as clear in this explanation as I should, but this can be verified by putting a small quantity of silica sand in a heated vat so that the temperature will just about fuse the sand. Notice how it will melt together into a solid mass. Then try the same amount of silica sand with a certain percentage of coal dust. You will then notice it requires twice the amount of time and almost twice the amount of heat to accomplish the same result. There is another reason why sea coal is mixed with the sand. This is to vent the mold and allow the gases to escape. Sea coal facing is made from the very best quality of soft or bituminous coal, containing neither slate nor phosphorus, but high in hydro-carbon gases and volatile matter; and the best gas coal makes the best sea coal facing. As stated previously, this is the only kind of facing that is mixed with the sand. All the others are either dusted on the mold or applied with the hand or brush, used wet or dry as the class of work requires. Not only is sea coal necessary to produce a good and sound casting, but a facing or blacking is needed that will close up the pores of sand on the face of the mold so as to produce a smooth surface, and also to a certain extent pave the way so that the molten metal will have an easy glide and at the same time overcome as much resistance as possible and not in any way retard the flow, but on the contrary help it along to find its proper resting place and prevent any of the sand from clinging to the casting after it has been shaken off. The facing must be of high carbon, so as not to burn away, but to remain on the surface of the mold and act as the separator between iron and sand. The best grade of separator (if we are allowed to use that name) is what we term plumbago, silver lead or graphite. These three names mean essentially one and the same thing. Strange as it may seem to the enlightened citizens of this country, a great ignorance exists as to the nature and uses of this material. While speaking of this I desire to correct the belief that it is dangerous to inhale plumbago or black lead, as it is commonly known. It is not a lead but a carbon almost pure, or a pure coal, the diamond being its most perfect specimen in the crystalized state.

* Read before the Western Foundrymen's Association, Chicago, July 21, 1897.

Probably the best grade of plumbago in its crude state is found in the Island of Ceylon, among the East India Islands. A fair quality is also found in New York State; but the greater part of the facings used in this country are made from the Ceylon grade. The crude plumbago is mined and carried from the mines in its crude state by the natives in baskets to above the ground; here it is separated, the lumps in one pile, chips and dust in another. It is then put up in large barrels or hogsheads and sent to this country in sailing vessels as ballast. The manufacturers receiving it in this manner, refine, reduce, pulverize and mix it to suit the various classes of work for which it is intended. This Ceylon plumbago being purer, richer, of a more particular nature, is best adapted for facing purposes. Unlike any other carbon or even graphite used for foundry purposes a pure and good grade of plumbago can be used for almost any kind of molding, such as dusting, putting on the mold with a brush, in dry sand or green sand work, or for core wash, either painting the cores or dipping them. This is probably the best facing to use and the foundrymen and molders are realizing this generally. In former years pounds were used while we might say tons are consumed at present. A pure plumbago is not affected by heat, cold or acid, and, on account of its greasy nature, acts as a sort of lubricator in the mold, helping the iron to find its proper resting place. In making stove plate castings and other light work which is very thin, an extremely smooth surface is required. Two facings are necessary for the finishing of a mold. A first or heavy facing to fill up the pores of the sand and a second or light facing to make a good print or impression on the surface of the mold and at the same time to prevent the heavy or first facing sticking to the pattern (thereby saving the mold from being disturbed), to assist in peeling the casting and lastly to give the casting its proper color. You will understand that stove plate castings are made so light and thin nowadays that any defect in molding could be easily seen, and therefore would make the castings useless for the purpose intended. Other castings might be plugged or filled, but stove plate casting cannot. The heavy facing used in stove plate molding is usually made from an extremely heavy carbon or graphite, while the light facing is a combination of charcoal and coke, etc., or lighter carbons. The heavy facing is to withstand the heat of the iron, while the lighter prevents the former from curling up or running before the iron and also prevents the mold from being disturbed and also gives the casting the desired color.

Besides the foregoing there are a number of different kinds of facings for different kinds of work, such as soapstone facing (which by the way is the only facing known, not of a dark color). This soap-stone is used for hollow ware and other light castings and is also used by foundrymen generally to mix with plumbago in order to cheapen it. In feeling, soapstone is of a greasy nature similar to plumbago, but soapstone cannot be used to any advantage by itself, but is applicable for general work if mixed with blackings. Soapstone facing used on the mold produces a light colored casting with the appearance of having been whitewashed.

In former years before the foundrymen used such quantities of imported plumbago, a certain Rhode Island facing was the standby and was supposed to be the cure for all evils in the foundry. It was used considerably then for all classes of work, but it has been supplanted by something better. Its nature was similar to plumbago, but not nearly as rich or pure. Its greatest drawback was that it was too "sticky" and that it would not "slick." But as the facing business has advanced, this Rhode Island facing has become a thing of the past and is now succeeded by those of higher grade and qualities.

Ceylon mineral facing, *X*, *XX*, *XXX*, *XXXX*, and as many more X's as you want to add, is made from a graphite coal and is used on general work in a foundry when a particularly smooth surface is not required, merely dusted on to save the casting-cleaner labor. This mineral facing in its different forms is used in car wheel foundries where it is essential and a good mineral facing is necessary. At the present prices ruling for car wheels and general car castings, foundrymen advise us that they cannot purchase as expensive blacking for this purpose as they could formerly, so it has been left to the facing manufacturers to produce a mineral facing at a minimum cost that can be dusted on the mold (not necessary to be "slicked"), that will prevent the iron from cutting into the sand, that will not affect the chill in any way, that will not burn away but bring out the casting free from the sand when shaken out.

There are many more different kinds of facings and blackings for the different kinds of work, and each and every manufacturer classes them according to his notion and pocketbook, but I have mentioned the principal ones, probably with the exception of pipe blacking. This requires a special blacking containing no impurities whatsoever, and extremely rich in carbon. In putting cast iron pipes to a hydraulic test impure or inferior blacking will show its results more than in any other class of iron founding. The blacking used in pipe foundries is subjected to a chemical analysis before its acceptance for this purpose.

Under foundry facings we might embrace blackings for dry sand work, but as that is almost a separate study of the business, I would prefer leaving it to some future time for discussion. However, I will refer to this class in a few words. For dry sand work, as well as painting cores, about the same ingredients are used as for dusting, only mixed in a different manner and such other ingredients added as will not dissolve in water but assimilate with it very easily. In mixing a blacking for a wash it should be mixed very carefully and worked just as our mothers made up their dough in making bread. Add a little blacking, then water, then blacking, then water, until you have secured the consistency wanted. If this blacking is so mixed it will be found to give much better satisfaction and at the same time save the molder and the casting-cleaner much annoyance.

Facings and blackings should always be kept in a dry place. As a rule they absorb more or less dampness and if they are damp they cause any amount of unnecessary trouble to molders, the result of which no doubt all of you have experienced. I have noticed time and again that if a casting is lost, first the facing is blamed, then the sand, etc., but never the molder. For the benefit of foundrymen in general, I desire to state that a facing and blacking will always show its defect in ways that can easily be traced. If of poor quality it will run or burn away, when the molten metal comes in the mold. If too much is used it will wash or run before the iron and allow the molten metal to cut deep into the sand, or if the metal is poured too hot the blacking is liable to curl up and slide into one corner of the mold. Too much sea coal used in the sand will show a mapped casting; not enough used will allow the sand to cling to the mold. Without going into the details of manufacturing these facings or their special uses, I trust I have interested you. It is an interesting and immense subject to us.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants :—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

M. F. Cahill, Lynchburg, Va., wants to buy a friction-drum, double-cylinder hoisting engine to lift a pile-driver hammer weighing 2,500 pounds; second-hand apparatus in good condition will do.

W. G. Thompson, Christie, Va., is in the market for an eight or 10-h. p. gasoline engine; second-hand, in good condition, preferred.

Bids are asked until Aug. 13 for supplying the Ordnance Department at Washington with five 12-inch disappearing gun carriages, L. F., Model 1896. Brig.-Gen. D. W. Flagler, Chief of Ordnance.

The Grant Ball Co., of Cleveland, was incorporated last week by Jas. R. Garfield, H. A. Garfield, Robt. H. Grant, Frank J. Pool and Mortimer G. Fox. The company will make and deal in balls, ball bearings, cups, cones and automatic screw machine products. The capital stock is $100,000.

New Construction:—

The Battle Creek Steam Pump Co., Battle Creek, Mich., is finishing a fine brick building, to be used in part for offices and in part for storage. The large establishment is running full handed.

The capacity of the great plant of the Washington Coke &

Because our Fathers and our Forefathers did—

Just because it has been the proper thing in the past to use a closed feed-water heater in rolling mills, blast furnaces and other large plants—it is no reason why we should take our bricks up in a hod on our back, when an endless chain worked by steam will do it for us at a smaller cost—or that we should burn tallow dips if we can obtain a better effect by turning or pressing a button—and similarly, some concerns in the iron and other industries are coming closer to present day practice by trying—just trying—**COCHRANE FEED-WATER HEATERS.**

From our lists of those who are "trying" these appliances we present the following names:

Ohio Steel Co.; Shoenberger Steel Co.; Oliver Wire Co.; Oliver I. & S. Co.; Reeves I. Co.; Clinton I. & S. Co.; Monongahela Furnaces; Weston Furnaces; Consolidated Wire & S. Co.; Firth-Sterling S. Co.; National Foundry & Pipe Co.; National Tube Works; Phosphor Bronze Smelting Co.; Sterling Iron & Railway Co.; National Galvanizing Works; Sharon Iron Co.; Oliver-Snyder Steel Co.

Yours for hot feed-water—real purification and **OPEN HEATERS,**

HARRISON SAFETY BOILER WORKS, Mfrs., Phila., Pa.

Coal Co. at Star Junction, Pa., will be doubled this fall at a cost of about $500,000. The company now has 320 coke ovens in operation and values its plant at over $1,000,000. The business has grown so rapidly that important improvements are now decided upon.

The Union Car Co., of Depew, N. Y., has leased the shops of the Schuylkill Navigation Co., at Reading, Pa., and proposes building a foundry and other buildings at that place to make chilled car wheels. The plant will be in charge of R. E. Coleman, who is also general superintendent of the company's works at Depew. It is reported that the contract for the foundry, which will be 100 x 150 feet, will be let at once. The proposed capacity is 400 wheels a day.

A plan has been agreed upon by the District of Columbia commissioners and the chief engineer of the Pennsylvania Railroad for the elevation of the tracks of that road through the streets of Washington. In connection with the proposed change, a new bridge in place of the present structure across the Potomac is to be built. The cost of the contemplated improvements will exceed $2,500,000.

At Newark, O., the Newark Weldless Tube & Steel Co. has started work on its new plant. Two buildings have been staked out—one 75 x 200 feet and the other, a pickling house, 30 x 50 feet. The capitalization is $500,000, with $90,000 to start with. Geo. H. Everson, of Pittsburg, vice-president and general manager, is about to let the contract for steel construction and machinery.

The Schultz Bridge & Iron Co., of McKee's Rocks, Pa., has been awarded the contract for the 100 x 130-foot building of the New Hamilton Tin Plate mill near West Newton, Pa.

Additions, Enlargements, Removals, Etc.:—

The Gadsden (Ala.) Pipe Works will increase the capacity of their plant.

The R. Stoever Foundry Co. at Myerstown, Pa., contemplates the enlargement of its plant in the near future.

Arrangements are now being made at Sheffield, Ala., to accept the proposition of a Pennsylvania company to remove a rolling mill and spike factory to Sheffield. The plant is to employ 150 men. Dr. C. B. Ashe is interested in the project.

At Dayton, Tenn., the Wheeler Electric & Mfg. Co. is enlarging its plant for the manufacture of the Wheeler dental engine. Additional steam power will be installed.

The Ellwood Tin Plate Co. will erect an addition to its plant in Ellwood City, Pa., for the purpose of making roofing plate. The new building will be 50 x 75 feet, with six stacks.

The Deering Harvester Co., Chicago, is adding new buildings to its plant, which occupies 63 acres. These buildings are of brick and stone. One is four stories high, 84 x 271 feet, and the othr is one story, 27 x 62 feet.

The Griffin Wheel Co. is enlarging its car wheel plant at South Tacoma, Wash. The present capacity is 25 wheels per day, which is to be increased to 100. The buildings will be extended, and new cupolas, engine boilers, etc., installed.

The Milwaukee Harvester Co., Milwaukee, Wis., has begun work on a $20,000 addition.

General Industrial Notes:—

The Lackawanna Iron & Steel Co., of Scranton, has ordered forward all the pig iron stored at Colebrook Furnaces, Lebanon. The stock there is considerable.

The Deering Harvester Co., Chicago, reports that its output this year will exceed its best previous record by 1,000 car loads. It has increased its force 500 men, and half of its departments are running day and night. It has two mills making binder twine, and is hardly able to keep up with orders. Its agents report farmers wiping out their debts and confident of good times.

At Birmingham, Ala.,, No. 1 basic open-hearth furnace of the Birmingham Rolling Mill Co. completed its first heat July 22. Everything is going well, and no fault is to be found with the working of the furnace or the appearance of the steel. Another furnace is to be added to the plant.

The Union Iron & Steel Co., Youngstown, O., has made a proposition to its finishers, agreeing to sign the same scale signed by Jones & Laughlins, and start its mills at once. The Amalgamated men replied that the entire scale must be signed, including that of the puddlers, and not a portion of it.

Tod Furnace of the Youngstown Steel Co., at Youngstown, O., was put in blast July 25 after improvements and repairs that amounted almost to a rebuilding.

The Youngstown Bridge Works, Youngstown, O., are filling several large contracts. In the past two weeks two trains of 25 cars, loaded with bridge construction have gone out.

The Ohio Tube Co,, Warren, Ohio, has been compelled to close its plant down temporarily owing to the coal strike.

The St. Louis (Mo.) Iron & Machine Works has two big engines—one 1,800 and the other 2,500 h. p.—under construction for the Consolidated Wire Co., of Pittsburg.

The property of the defunct Linden Steel Co., of Pittsburg, was bought in at Sheriff's sale last week for $86,000. The Pittsburg Bank for Savings and H. Sellers McKee, who were the purchasers, had issued executions for $104,196 against the plant.

The work on the improvements to the Falcon Tin Plate & Sheet Co.'s plant at Niles, O., is going forward rapidly and it is expected that six hot mills will be in operation before the end of August.

The Scottdale Iron & Steel Co., Scottdale, Pa., has proposed a new scale with the minimum basis for sheets put at 2.10c instead of 2.5c. It is claimed by the men that 15 to 20 per cent more work must be done to secure former wages. The amalgamated men are firm, and the company has advertised for non-union men. Changes necessitated by the use of gas have delayed starting up thus far.

The receivers of the Stewart Mfg. Co., of West Newton, Pa., report the assets to be $52,000 and the liabilities $20,000. The court will be asked to order the sale of the property.

The Brownell Car Co., St. Louis, has assigned, with liabilities of $182,364.

The Lebanon rolling mill, at Lebanon, Pa., was sold July 17 by Sheriff Reuben Stine to Richard Meily for $38,600.

Means, Kyle & Co. have furnished constant employment

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ST. PAUL, TACOMA, PORTLAND. ST. LOUIS, CINCINNATI, SAN FRANCISCO.

OPENHEARTH STEEL CRUCIBLE CASTINGS.

the past year to a considerable force of men, in digging ore on lands near the Pine Grove Furnace in Lawrence Co., O.

The Bethlehem Iron Co.'s plate mill has been closed to permit of making improvements. Relining is in progress at the company's blast furnaces. The rail mill is off for a time, but will resume active operations in August.

The New Castle Steel & Tin Plate Co. has elected the following officers: President, George Greer; vice-president, John Stevenson; secretary, Charles Greer; treasurer, William S. Foltz. The directors are S. W. Cunningham, Pittsburg; Edwin Norton, Chicago; James McLean, New York, and George Greer, J. P. G. Cunningham, William S. Foltz and John Stevenson, of New Castle.

The machine shop at the Bay View works of the Illinois Steel Co. closed Saturday. It is reported to have been sold.

The Carnegie Steel Co., Ltd., has just placed an order for 6,500 h. p. of Cahall vertical boilers for Furnaces D and E at the Edgar Thomson plant. This is the fourth order placed for this kind of boilers by the Carnegie Steel Co., aggregating a total of nearly 15,000 h. p. The Cahall people are also building 4,000 h. p. boilers for the Shenango Valley Steel Co., of New Castle, and 6,000 h. p. for a new sugar refinery. They have in their shops now unfinished orders for upwards of 30,000 h. p., including boilers for the Brooklyn Edison Co., the Union Traction Co., of Philadelphia, the Detroit & River St. Clair Electric Ry. Co., the Pittsburg Plate Glass Co., the Buhl Steel Co., of Sharon, Pa; the North Hudson Railway Co., and the Hudson Electric Light Co., of Hoboken, N. J.

The engine-house and stock-house of the Reed Island Iron Co.'s charcoal furnace in Pulaski county, Va., have been rebuilt since the fire a few months ago.

Lynchburg Furnace at Lynchburg, Va., has been abandoned.

The Ohio Iron Co., Zanesville, O., has given up its lease of the two New York furnaces at Shawnee, O., and they are idle.

The King, Gilbert & Warner Co., of Columbus, O., has abandoned and dismantled its Moxahala Furnace, at Moxahala, O. The company's new Steelton Furnace at South Columbus is expected to be ready to blow in this week. It will have a capacity of 120,000 tons a year. Pocahontas & New River coke will be used.

Napier Furnace at Napier, Tenn., will produce coke iron hereafter, instead of charcoal iron. Additional boilers have been added since May, when the furnace blew out.

The Bessie Furnace Co., S. Frank Eagle, president, and Wm. S. Eagle, secretary and treasurer, has leased Bessie Furnace at New Straitsville, O., from the C. & H. C. & I. Co., and will soon put it in blast.

At the New Philadelphia (O.) Iron & Steel Co.'s plant four sheet mills are working, but the sheet bar and puddling plants are idle, with little prospect of starting up. As sheet bars can be bought cheaper than they can be made at this and similar plants, it does not pay the latter to make sheet fagots; hence their sheet scrap goes on the market instead of being worked up.

The Isabella Furnace Co., of Etna, Pa., was formally incorporated last week by A. E. W. Painter, Park Painter, J. Painter, Jr., John W. Chalfant and George A. Chalfant.

The Pittsburg Wire Co., of Braddock, Pa., made 45,137 kegs of wire nails during June—the largest month's output in the history of the company.

The stockholders of the Stewart Mfg. Co., of West Newton, Pa., will endeavor to raise a fund to buy the plant. Otherwise the property will be sold early in August.

H. M. Priest, receiver of the Brilliant Tube & Pipe Works, Brilliant, Jefferson Co., O., has advertised the sale of the plant on Aug. 9.

SEASHORE EXCURSION.

Via Pennsylvania Lines This Summer.

General excursions to the seashore at exceptional low rates will be inaugurated by the Pennsylvania Lines this summer, offering grand opportunity for delightful outings at the most

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123 AND 125 WATER STREET, **PITTSBURG, PA.** 124 AND 126 FIRST AVENUE.

MACHINE TOOLS AND SUPPLIES.

Some SECOND-HAND TOOLS in stock.

1—8-ft. Boring Mill.
1—No. "D" Horizontal Boring & Drilling Machine.
1—Garvin Profiler.
1—A. T. & M. Co. Valve Milling Machine.
4—No. 11 Brown & Sharpe Milling Machines.
2—No. 1½ Stiles Presses.
1—No. 3 Stiles Press.
1—36-in. G. & E. Spur Gear Cutter.
2— Crank Planers.
3—No. 1 Brown & Sharpe Screw Machines.
2—No. 6 Brown & Sharpe Screw Machines.
1—36-in. Car-wheel Borer.
1—55-in. Pneumatic Riveter.
1—30-in. Pulley Lathe.
1—Pratt & Whitney Turret Lathe.
1—109 in. Engine Lathe.
1—15-in. Fox Turret Lathe.
1—20-in. Lodge-Davis Turret Lathe.
1—20-in. x 10-ft. Gleason Engine Lathe.
1—24-in. x 12-ft. Gleason Engine Lathe.
1—3-Spindle Drill Press.
2—30-in. Drill Presses.

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Steel Plants, Sheet and Tin Plants, Gas Furnaces and Producers Structural Iron and Steel.

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Manufacturers and Electrical Engineers,

announce that they have established a Western Office at 1514-1516 Old Colony Building, CHICAGO.

Customers in this territory are thus placed in direct communication with the Company.

In addition to the well known line of ELECTRIC MOTORS manufactured by this Company, attention is called to the CROCKER-WHEELER DIRECT CONNECTED GENERATORS and DIRECT CONNECTED MOTORS now extensively in use on large tools of all descriptions.

popular ocean resorts on the continent. This announcement will be good news to persons who may desire to enjoy their vacation at the seaside. They may visit Atlantic City, Cape May, Avalon, Sea Isle City, Anglesea, Ocean City, Holly Beach or Wildwood at very low fare, round trip tickets to either resort being obtainable at the same rate.

The first excursion will be run Thursday, July 15th, followed by a second four weeks later, Thursday, August 12th. Round trip rates to either Atlantic City, Cape May, Avalon, Sea Isle City, Anglesea, Ocean City, Wildwood or Holly Beach, New Jersey, will be $12.50 from Ft. Wayne and Toledo; $12 from Lima, Crestline, Tiffin, Mansfield; $11.50 from Orrville, Cleveland, Canton, Massillon, Youngstown, Girard, Niles; and $11 from Alliance.

The return limit will cover 12 days, including date of sale, which will be ample for customary ten days' vacation. For further desired information, address C. L. Kimball, Assistant General Passenger Agent, Cleveland, O., for particulars. Illustrated description of resorts to which excursion tickets will be sold, with list of hotels and boarding houses at each, will be furnished upon application.

SECOND SEASHORE EXCURSION.

Via Pennsylvania Lines Thursday, August 12th.
Choice of Ten Popular Ocean Resorts.
$11.50 Round Trip from Cleveland.

The first Seashore Excursion over the Pennsylvania Lines was a grand success. Nearly 2,000 persons took advantage of the extremely low rates and enjoyed delightful trips to the most popular summer havens along the Atlantic Coast.

The second excursion over the Pennsylvania Route will be run Thursday, Aug. 12. Two more resorts have been added to the list of points to which tickets will be sold, making a total of ten resorts, all of which are well known places of summer sojourn, viz.: Atlantic City, Cape May, Avalon, Anglesea, Ocean City, Sea Isle City, Holly Beach, Wildwood, New Jersey, and Rehoboth Beach, Delaware, and Ocean City, Maryland, the latter two being the new points in question.

The round trip rate will be only $11.50 from Cleveland to either resort, the return limit covering 12 days including date of sale.

Through train and through car service for this excursion will be very convenient. Pullman Vestibule Sleeping Cars and Pennsylvania Standard Coaches will be run without change through Pittsburg and Philadelphia to Atlantic City on Train No. 6, leaving Cleveland at 1:40 P. M., Aug. 12. Excursion tickets will also be good going Aug. 12, on any through train except the Pennsylvania Limited.

The date of the second excursion is particularly convenient. Business is practically at a standstill during the middle of August. It is the season of rest in the city and country, and a week or two cannot be spent more pleasantly nor profitably than at one of these attractive ocean retreats. The invigorating breeze from the sea, the myriads of interesting sights and the opportunity for health-giving recreation make these seashore excursions ideal vacation trips. Persons who participate in them will return to their homes strengthened in both mind and body for a renewal of the labors attendant upon the opening of the fall and winter seasons.

For detailed information regarding tickets, time of trains and other particulars, apply to nearest Pennsylvania Lines, or address C. L. Kimball, assistant general passenger agent, Cleveland, O.

LOW RATES.

Via Pennsylvania Lines.

Special reductions in fare over the Pennsylvania Lines will be granted for numerous events to take place this summer in various parts of the United States, in addition to local excursions. Some of the points to which tickets will be sold and dates of sale are as follows:

To Nashville, Tenn., daily to October 15th, for Tennessee Centennial and International Exposition.

To Winona Assembly Grounds, Eagle Lake (near Warsaw, Ind.), May 15th to August 31st, for Annual Assembly and Summer School.

To Indianapolis, August 17th and 18th, for Y. P. C. U. Annual Convention.

To Indianapolis, September 8th and 9th, for National Encampment Sons of Veterans.

The reduced rates over the Pennsylvania Lines will not be restricted to members of the organization mentioned, but may be taken advantage of by the public generally. Excursion tickets may be obtained at ticket offices on the Pennsylvania System and will be sold over this route by connecting railways. Any Pennsylvania Line Ticket or Passenger Agent will furnish desired information concerning rates, time of trains, return limit, and other details to all applicants, or the same may be obtained by addressing C. L. Kimball, Assistant General Passenger Agent, Cleveland, O.

Chance for a Cheap Trip East.

It is offered by the Pennsylvania Lines, over which low rate round-trip tickets to Philadelphia will be sold, Aug. 2, 3 and 4, account L. A. W. meet. The excursion rate is open to all. Get particulars of nearest Pennsylvania Line ticket agent.

A Lake Tour to the Island of Cool Breezes.

Go to Mackinac Island, Mich., via the Coast Line. The D. & C. new steel passenger steamers leave Toledo, Mondays and Saturdays, 10.30 A. M., and Tuesdays and Thursdays, 4.30 P. M. From Detroit, Mondays and Saturdays, 11.00 P. M., Wednesdays and Fridays, 9.30 A. M. Send two cents for illustrated pamphlet. Address A. A. Schantz, general passenger agent, Detroit, Mich.

Steam Yachts and Marine Machinery.

Also Towing Launches built by Marine Iron Works, Clybourn and Southport avenues, Chicago. Free illustrated catalogue. Write them for it.—*Adv.*

"Metallurgy of Cast Iron,"

By THOS. D. WEST; 107 engravings, 583 pages. Just issued. A valuable work to Founder, Molder, Draughtsman, Designer, Technical School Specialist. Chemistry of Iron; cheaping of mixtures; the effect of the metalloids in changing the grade of iron; latest improvements in cupola construction and practice—all are fully covered. Price $3. Sent postpaid on receipt of price, by *The Iron Trade Review Co.*, Cleveland, O; 1142 Monadnock Block, Chicago, Ill.

James M. Swank, author of "Iron in All Ages," and editor of the *Bulletin* of The American Iron & Steel Association, in reviewing "Metallurgy of Cast Iron," says it is "One of the most valuable publications relating to the manufacture of iron castings, that has ever, to our knowledge, been issued in this or any other country."

DOES YOUR ROOF LEAK?

If an old leaky tin, iron or steel roof, paint it with Allen's Anti-Rust Japan. One coat is enough; no skill required; costs little; lasts long.

The name describes it; proof against water, time, climate, and fumes of every description. Stops leaks, and prolongs the life of an old roof.

If you want evidence write us. To be returned at our expense if not satisfactory.

This Anti-Rust is also of highest value in protecting metal pipes, fans, etc., at mines, exposed to the corroding effects of *mine air* and *mine water*.

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The Chicago, Milwaukee & St. Paul Railway Company owns and operates 6,154 miles (9,900 kilometers) of railway, exclusive of second track, connecting track or sidings. The eight States traversed by the lines of the company, Illinois, Wisconsin, Northern Michigan, Iowa, Missouri, Minnesota, South Dakota, and North Dakota, possess, in addition to the advantages of raw material and proximity to markets, that which is the prime factor in the industrial success of a territory—a people who form one live and thriving community of business men, in whose midst it is safe and profitable to settle. Many towns on the line are prepared to treat very favorably with manufacturers who would locate in their vicinity.

Mines of coal, iron, copper, lead and zinc, forests of soft and hard wood, quarries, clays of all kinds, tan-bark, flax and other raw materials exist in its territory in addition to the vast agricultural resources.

A number of new factories have been induced to locate—largely through the instrumentality of this company—at towns on its lines. The central position of the States traversed by the Chicago, Milwaukee & St. Paul Railway, makes it possible to command all the markets of the United States. The trend of manufacturing is Westward. Nothing should delay enterprising manufacturers from investigating. Confidential inquiries are treated as such. The information furnished a particular industry is reliable.

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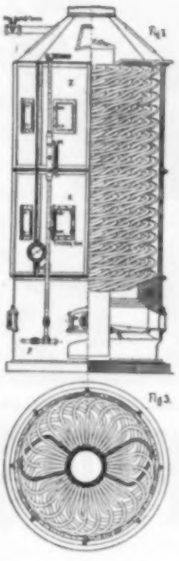

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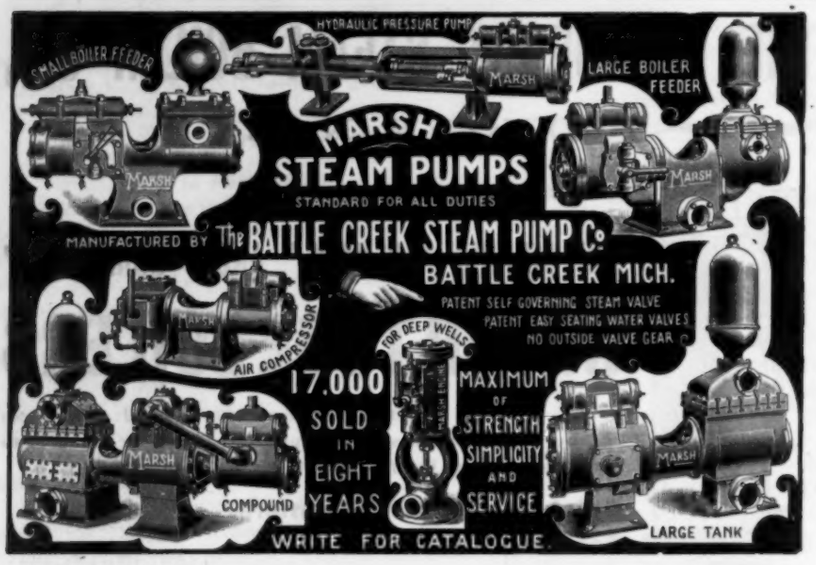

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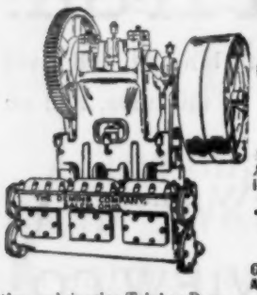
Will be sent postpaid by *The Iron Trade Review* at **$6.**

Is a thorough revision of the list of blast furnaces, rolling mills, Bessemer and Open-Hearth steel works, plate and sheet mills, nail mills, tin plate mills, malleable, cast iron pipe and wrought pipe works, car wheel and locomotive works.



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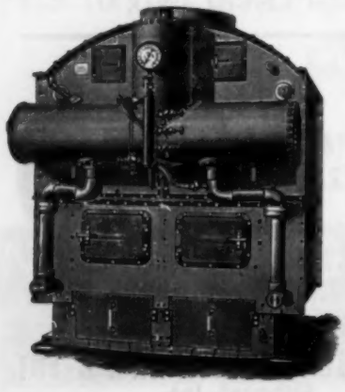

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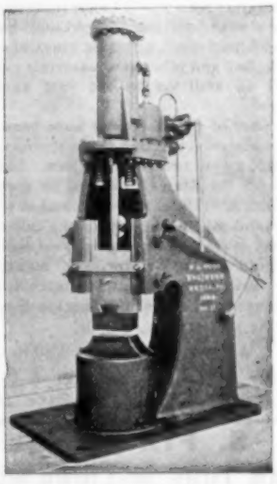

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Daily. † Daily, except Sunday.

FROM CLEVELAND TO	LEAVE	ARRIVE
Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	† 3:15 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	* 5:00 pm	* 8:40 am
Philadelphia and New York	*11:10 pm	* 4:30 am
Baltimore and Washington	*11:10 pm	* 4:30 am
Alliance and Pittsburgh	*11:10 pm	* 4:30 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:50 am	* 5:30 pm
Akron and Columbus	* 8:50 am	* 5:30 pm
Akron and Columbus	† 1:40 pm	†12:10 pm
Columbus and Cincinnati	* 8:00 pm	* 7:30 am

The Cleveland Terminal & Valley R. R. Co.

(B. & O. System.)

Depot foot of So. Water St. / City Office 241 Superior St.	Arrive.	Depart.
Valley Jctn. & Way Stations	*6:20 P M	*7:10 A M
Akron, Canton & Valley Jct	*10:00 A M	*3:30 P M
Akron, Canton & Chicago	*8:10 A M	*6:35 P M
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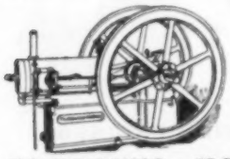

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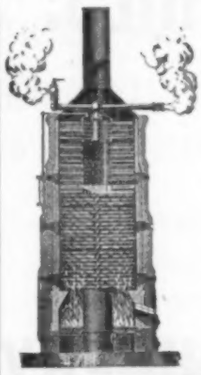

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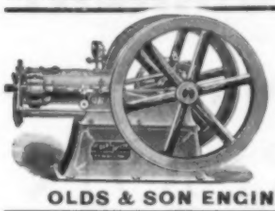

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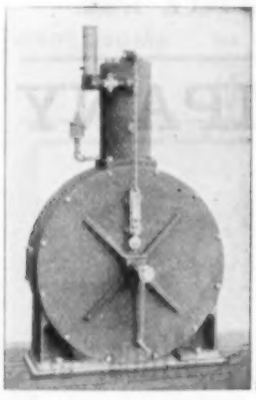

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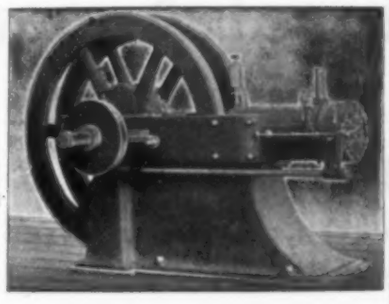

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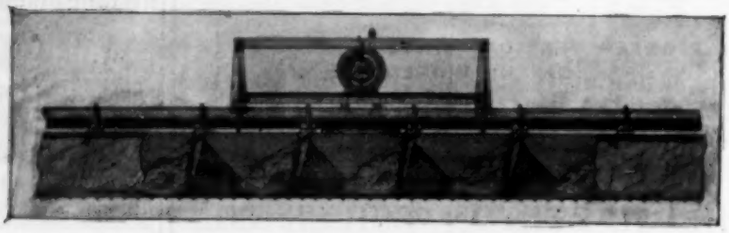

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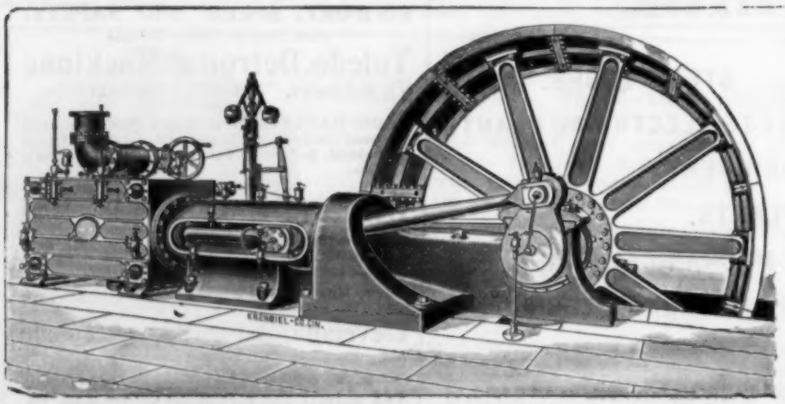

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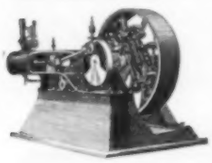

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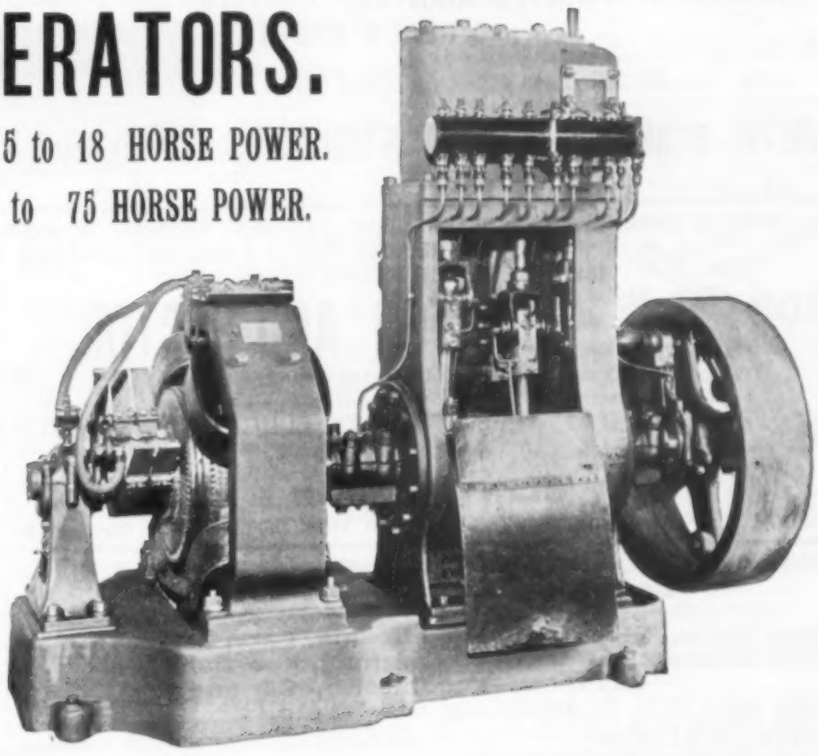

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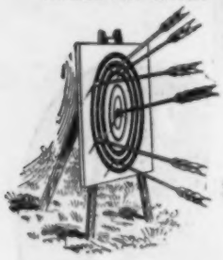

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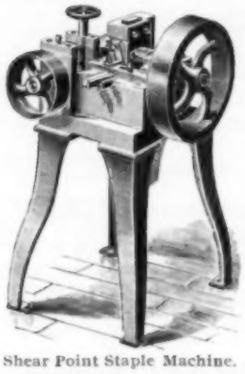

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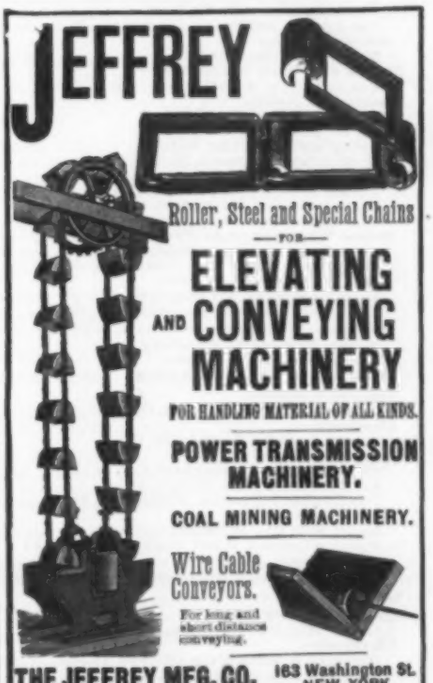

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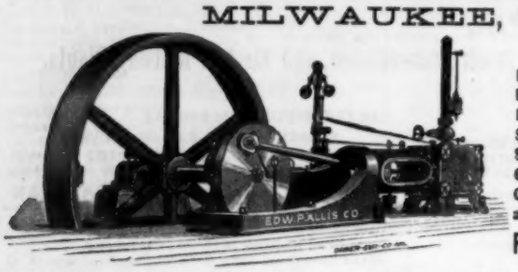

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No. 1 Specular, Bessemer	3.05@3.17
No. 1 Bessemer hematite	2.60@2.90
Hematites No. 1 non-Bessemer	2.00@2.15
No 1. Specular, non-Bessemer	2.40@2.60

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$ 9 65
No. 1 Strong Foundry	10 25@10 65
No. 2 Strong Foundry	9 65@10 15
No. 1 Gray Forge, red short	8 65
No. 2 Gray Forge, neutral	8 75
No. 1 American Scotch	10 40
No. 2 American Scotch	10 15
Lake Superior Charcoal	12 75@13 00
PITTSBURG:	
No. 1 Foundry	$10 25@10 50
No. 2 Foundry	9 50@9 75
Gray Forge	8 40@8 50
White and Mottled	8 50
Warm Blast Charcoal	14 50@15 00
Cold Blast Charcoal	17 00
Bessemer	9.30@9 50
CHICAGO:	
Lake Superior Charcoal	$13 00@$13 20
Local Coke Foundry No. 1	10 25@10 75
Local Coke Foundry No. 2	10 25@10 50
Local Coke Foundry No. 3	10 00@10 25
Local Scotch Foundry No. 1	10 50@10 75
Local Scotch Foundry No. 2	10 25@10 50
Local Scotch Foundry No. 3	10 00@10 25
Southern Coke No. 1	10 50@11 00
Southern Coke No. 2	10 00@10 25
Southern Coke No. 3	9 75@10 00
Southern No. 1 Soft	10 50@11 00
Southern No. 2 Soft	10 00@10 50
Southern Silveries	10 25@10 50
Jackson Co. Silveries	13 00@15 00
Ohio Silveries No. 1	13 00@15 00
Ohio Strong Softeners	12 00@12 25
Alabama Car Wheel	16 50@16 00
Malleable Bessemer	10 75@11 00
Coke Bessemer	11 50@12 00
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$ 9 70
Southern Coke No. 2 and No. 1 Soft	9 50
Hanging Rock Coke, No 1	12 50@13 50
Hanging Rock Charcoal No. 1, Fdy	14 50@15 50
Tennessee Charcoal No 1	12 50@13 00
Jackson County Silvery No 1	12 50@13 00
Southern Coke, Gray Forge	8 00@8 25
" " Mottled	8 00
Standard Georgia Car Wheel	14 25@15 00
Tennessee " "	13 00@14 00
Lake Superior " "	14 75@15 25
BUFFALO:	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$10 50@10 75
No. 2 Foundry Strong Coke Iron Lake Superior Ore	10 25@10 50
Ohio Strong Softener No. 1	10 50@10 75
Jackson Co. Silvery No. 1	13 50@14 00
Lake Superior Charcoal	14 00
Southern Soft No. 1	10 75
Hanging Rock Charcoal	17 00
ST. LOUIS:	
Southern Coke No 1	$ 9 50@$ 9 75
Southern Coke No. 2	9 00@9 25
Southern Coke No. 3	8 50@8 75
Southern Gray Forge	8 00@8 25
Southern Charcoal No. 1	13 00
Missouri Bessemer	12 00
Ohio Softeners	13 50
Lake Superior Car Wheel	14 50
Southern Car Wheel	14 50

OLD RAILS AND SCRAP METAL.

[Delivered Cleveland.]	GROSS TONS
Old iron rails	$10 50
Old steel rails (6 ft. and over)	9 25
Old steel rails (6 ft. and under)	8 75
Old car wheels	9 25
	NET TONS
No. 1 R. R. wrought scrap	$ 9 00
Mill scrap	6 75
No. 1 Machine cast scrap	8 00
Iron axles	12 00
Axle turnings	7 00
Wrought turnings (free from cast)	5 50
Cast borings	4 50
Uncut wrought iron boilers	3 50
Steel boiler plates	7 00
Grate bars	5 00
Pipes and flues (clean)	6 50
Tank iron	7 00
Hoop and band iron	5 00
Sheet iron	5 00
Wrought drillings	5 00
Malleable iron	3 50

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. Cleveland)	1.10c
Angles	1.05c
Tees	1.15c
Universal Plates	1.10@1.15c
Sheared Plates	1.15c

MERCHANT IRON AND STEEL.

[Less than car-lots, Cleveland.]

Rounds and Squares.—Bar Iron.

1 to 1⅞	1.00 Base
2 to 2⅞	.20 extra
3 to 3⅜	.50 "
3½ to 4	.80 "
4⅛ to 4⅝	1.00 "
4⅞ to 5	1.30 "
5⅛ to 6	1.80 "
6¼ to 6¾	2.20 "

PERFORATED METALS

OF ALL KINDS FOR

MILLING, MINING AND AGRICULTURAL MACHINERY.

Perforated Iron, Steel, Copper, Brass, Tin, Zinc, Lead, Etc., to Order.
Large and Varied Assortment of Sizes. Correspondence Solicited.

THE ROBERT AITCHISON PERFORATED METAL CO.,

Office, Room 510, 265 to 269 Dearborn St., CHICAGO, ILL. Works, So. Chicago.

Dixon's Pure Flake Graphite

Is a Blessing to Every Engine Room and Machine Shop.

A small quantity added to any Oil or Grease largely increases its lubricating value and makes the finest Cooling Mixture.

Pamphlet and Sample Sent Free.

JOS. DIXON CRUCIBLE CO., Jersey City, N. J.

Don't Waste Money in Your Pattern Shop.

THE GOBEILLE PATTERN CO., Cleveland.

"Metallurgy of Cast Iron,"

By THOS. D. WEST; 107 engravings, 583 pages. Just issued. A valuable work to Founder, Molder, Draughtsman, Designer, Technical School Specialist. Chemistry of Iron; cheaping of mixtures; the effect of the metalloids in changing the grade of iron; latest improvements in cupola construction and practice—all are fully covered. Price $3. Sent post-paid on receipt of price, by *The Iron Trade Review Co.*, Cleveland, Ohio; 1142 Monadnock Block, Chicago, Ill.

James M. Swank, author of "Iron in All Ages," and editor of the *Bulletin* of The American Iron & Steel Association, in reviewing "Metallurgy of Cast Iron," says it is "One of the most valuable publications relating to the manufacture of iron castings, that has ever, to our knowledge, been issued in this or any other country."

Not every insertion of every advertiser's card brings an order for the advertiser's good; no more does every visit of the traveling salesman result in a sale.

There is a vast deal in familiarity with the type and phrase in which a manufacturer makes himself known to the advertisement reader, just as the personal acquaintance of his traveling salesman gets him a hearing when a strange face and a strange voice are bowed out with a "busy day's" courtesies.

The best advertisers, the most successful advertisers, the advertisers who get returns, are those who keep everlastingly at it.

This is a case in which familiarity breeds business.

IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.

CLEVELAND OHIO.

Trade Mark Patented.

ORDER DIRECT FROM THE

Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

6⅝ to 7¾	2.50 extra.
¼ to ⅜	.10 "
⅝ to 11-16	.20 "
½ to 9-16	.30 "
7-16 to 15-32	.40 "
⅜ to 13-32	.50 "
5-16 to 11-32	.70 "
¼ to 9-32	.90 "
7-32	1.40 "
3-16	2.50 "

Flats.—Bar Iron.

1½ to 4 x ⅜ to 1	1.05 Base.
4¼ to 6 x ⅜ to 1	.10 extra.
6¼ to 8 x ⅜ to 1	.60 "
8¼ to 10 x ⅜ to 1	.80 "
1⅓ to 4 x 1 1-16 to 1½	.30 "
4¼ to 6 x 1 1-16 to 1½	.40 "
6¼ to 8 x 1 1-16 to 1½	.60 "
8¼ to 10 x 1 1-16 to 1½	.90 "
2 to 4 x 1⅝ to 2	.50 "
4¼ to 6 x 1⅝ to 2	.60 "
6¼ to 8 x 1⅝ to 2	.80 "
8¼ to 10 x 1⅝ to 2	1.00 "
2 to 4 x 2⅛ to 3	.60 "
4¼ to 6 x 2⅛ to 3	.80 "
6¼ to 8 x 2⅛ to 3	1.00 "
1⅛ to 1⅜ x ⅜ to 1	.10 "
1 10 1 1-16 x ⅜ to ⅝	.20 "
¾ to 15-16 x ⅜ to ¾	.40 "
⅝ to 11-16 x ⅜ to ⅝	.50 "
½ to 9-16 x ⅜ to ½	.90 "

Heavy Band Iron.

7 to 10 x ¼ to 5-16	.70 extra.
6¼ to 6¾ x ¼ to 5-16	.50 "
4¼ to 6 x ¼ to 5-16	.30 "
1½ to 4 x ¼ to 5-16	.20 "
1 to 1⅜ x ¼ to 5-16	30 "
¾ to 15-16 x ¼ to 5-16	.50 "
⅝ to 11-16 x ¼ to 5-16	.80 "
½ to 9-16 x ¼ to 5-16	1.00 "
⅜ to 7-16 x ¼ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ¼ to 5-16 thick. **Bevel Edge Shaft Iron** 1-10 higher than same size of Heavy Bands.

Light Band Iron.

7 to 8 x No. 9 to 3-16	.90 extra
7 to 8 x Nos. 10, 11 and 12	1.00 "
6¼ to 6¾ x No. 9 to 3-16	.70 "
6¼ to 6¾ x Nos. 10, 11 and 12	.80 "
4¼ to 6 x No. 9 to 3-16	.50 "
4¼ to 6 x Nos. 10, 11 and 12	.60 "
1¼ to 4 x No. 9 to 3-16	.40 "
1¼ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	.60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ¾ x No. 9 to 3-16	1.00 "
9-16 to ¾ x Nos 10, 11 and 12	1.10 "
7-16 to ½ x No. 9 to 3-16	1.30 "
7-16 to ½ x Nos. 10, 11 and 12	1 40 "
⅜ x No. 9 to 3-16	1.50 "
⅜ x Nos. 10, 11 and 12	1.60 "

Bevel Edge Box Iron.

Same as Light Bands, of same sizes.

Beaded Band Iron, 1¼ in. to 2 in. .70

Sand Band Iron, 1-10 c. above same sizes of Light Bands.

Oval Iron.

⅞ to 1⅛	.40 extra.
¾ to 13-16	.50 "
⅝ to 11-16	.60 "
½ to 9-16	.80 "
⅜ to 7-16	1.10 "
½ to 9-16 x 3-16	1.00 "
⅝ to 11-16 x ⅛	1.20 "

Half Oval and Half Round.

2¼ to 3	.60 extra.
⅞ to 2	.50 "
¾ to 13-16	.70 "
⅝ to 11-16	90 "
½ to 9-16	1.20 "
⅜ to 7-16	2.50 "
5-16	3.50 "
¼	4 50 "

Half Ovals less than ¼ their width in thickness, extra price.

Horse Shoe Iron.

All sizes 1 c. extra.

Cutting ordinary bars to specified length, .20 to .30 extra, according to length and size.

Steel Bands.

Width In Inches.	English Standard Gauge.	
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16"	1.50 Base.
		Extras.
1¼ to 6,	" 10, 11, 12 or 1/4"	.05 per 100 lbs.
1 to 1¾,	" 7, 8, 9 or 3-16"	.10 "
1 to 1¾,	" 10, 11, 12 or 1/4"	.15 "
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20 "
13-16 and ⅞,	" 10, 11, 12 or 1/4"	.25 "
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30 "
11-16 and ¾,	" 10 11, 12 or 1/4"	.35 "
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40 "
9-16 and ⅝,	" 10 11, 12 or 1/4"	.45 "
½, Nos. 7, 8, 9 or 3-16"		.55 "
½, " 10, 11, 12 or 1/4"		.60 "
7-16 " 7, 8, 9 or 3-16"		.75 "
7-19 " 10, 11, 12 or 1/4"		.85 "
⅜, " 7, 8, 9 or 3-16"		.95 "
⅜, " 10, 11, 12 or 1/4"		1.05 "

Iron and Steel Hoops.

Width in Inches.	English Standard Gauge.	
1 7-16 to 3	Nos. 13, 14, 15 and 16	1.60 Base
		Extras
1 7-16 to 2,	" 17, 18, and 19	.05 per 100 lbs.
1 7-16 to 2,	" 20	.10 "
1 7-16 to 2,	" 21	.15 "
1 7-16 to 1¾,	" 22	.25 "
1 ⅛ to 1⅜,	" 13, 14 and 15	.05 "
1¼ to 1⅜	" 16,17 and 18	.10 "

R. D. NUTTALL CO.,

99 BOQUET STREET, ALLEGHENY, PA.

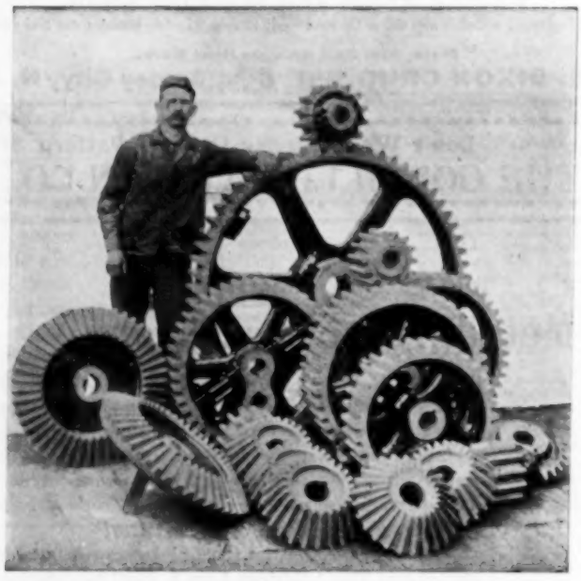
This sample lot of

Heavy Duty GEARS

indicates a few of the various types we are daily sending out cut from

IRON, STEEL or BRASS.

We solicit correspondence.



EVERYONE BUT REPAIRMEN IS ENTHUSIASTIC OVER THE 1897.

Windsor BICYCLES

STRICTLY HIGH GRADE.

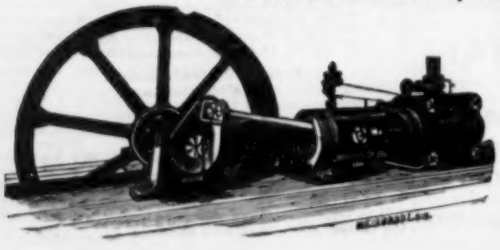
The only wheel in the world fitted with watch-case dust caps over all bearings. Adds 50 per cent to the life of a wheel.

MADE BY Chas. H. Sieg Mfg. Co. KENOSHA WIS.

CHICAGO OFFICE and SALESROOM, 285 Wabash Ave.

THE LANE & BODLEY CO.,

CINCINNATI, OHIO.



Engines,

ALL SIZES.

Simple and Compound.

Shafting, Hangers, Pulleys.

Belt Elevators, Saw Mills.

1¼ to 1⅜,	"	19 and 20	.15 per 100 lbs.
1⅛ to 1⅜,	"	21	.20 "
1⅛ to 1⅜,	"	22	.30 "
15-16 and 1,	"	13, 14 and 15	.10 "
15-16 and 1,	"	16, 17 and 18	.15 "
15-16 and 1,	"	19 and 20	.20 "
15-16 and 1,	"	21	.25 "
15-16 and 1,	"	22	.35 "
⅞,	Nos. 13, 14 and 15		.20 "
⅞,	" 16, 17 and 18		.25 "
⅞,	" 19 and 20		.30 "
⅞,	" 21		.35 "
⅞,	" 22		.45 "
¾ and 13-16	Nos. 13, 14 and 15		.30 "
¾ and 13-16	" 16, 17 and 18		.35 "
¾ and 13-16	" 19 and 20		.40 "
¾ and 13-16	" 21		.45 "
¾ and 13-16	" 22		.50 "
¾ and 13-16	" 23		.60 "
11-16,	Nos. 13, 14 and 15		.35 "
11-16,	" 16, 17 and 18		.40 "
11-16,	" 19 and 20		.50 "
11-16,	" 21		.60 "
11-16,	" 22		.70 "
11-16,	" 23		.80 "
⅝,	Nos. 13, 14 and 15		.40 "
⅝,	" 16, 17 and 18		.45 "
⅝,	" 19 and 20		.55 "
⅝,	" 21		.65 "
⅝,	" 22		.75 "
⅝,	" 23		.85 "
9-16,	" 13, 14 and 15		.45 "
9-16,	" 16, 17 and 18		.50 "
9-16,	" 19 and 20		.60 "
9-16,	" 21		.70 "
9-16,	" 22		.80 "
9-16,	" 23		.90 "
½,	" 13, 14 and 15		.55 "
½,	" 16, 17 and 18		.60 "
½,	" 19 and 20		.70 "
½,	" 21		.80 "
½,	" 22		.90 "
½,	" 23		1.00 "
7-16,	" 13, 14 and 15		.80 "
7-16,	" 16, 17 and 18		.90 "
7-16,	" 19 and 20		1.00 "
3⅛,	" 13, 14 and 15		1.00 "
3⅛,	" 16, 17 and 18		1.10 "
3⅛,	" 19 and 20		1.20 "

Sheet Iron.

No. 10	1 50
No. 12	1 70
No. 14	1 60
No. 15-17	1 75
No. 18	1 85
No. 20	2 00
No. 22-24	2
No. 25-26	2 20
No. 27	2 30

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

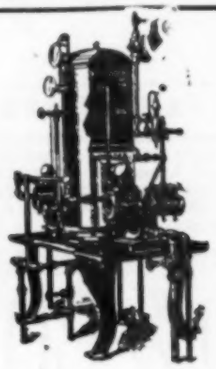
The Link-Belt Machinery Co.

ENGINEERS. FOUNDERS. MACHINISTS.

CHICAGO, U. S. A.

Modern Methods as applied to the handling of Iron Ore, Coal, Raw and Manufactured Products.

Manila Rope, Power Transmissions, Shafting, Pulleys, Shaft Bearings, Gearing Friction Clutches, etc.



IMPROVED DUPLEX SYSTEM
- - - FOR - - -
BURNING FUEL OIL.

Heats and cleans the oil and delivers it to the fires under high and uniform pressure.

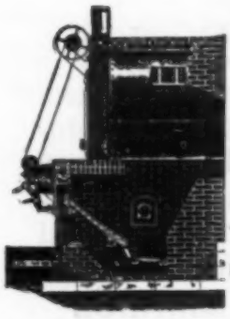
Entirely automatic, most scientific, sensible and economical method of burning oil in existence. If you are operating a Steel Works, Brass or Copper Rolling Mill, Malleable Iron Works, Bolt and Nut Works, Bicycle Works, or do Annealing, Forging, Brazing, Tempering, Japanning, Enameling, Case Hardening, you can use this machine to your advantage.

WE BUILD FURNACES OF ALL KINDS. SATISFACTION GUARANTEED.

W. S. ROCKWELL & CO.,

26 CORTLANDT STREET, NEW YORK.

H. H. CAMPBELL.



Brightman Furnace Co.

648 Broadway, CLEVELAND, O.

SOLE MANUFACTURERS OF THE

Brightman Mechanical Stoker

FOR STEAM BOILERS.

THE MOST ECONOMICAL IN FUEL

and the Best Device in the World for Preventing Smoke.

Send for Catalogue "A."

STUART FIRE BRICK CO.

MANUFACTURERS OF

Silica Brick

For Open-Hearth, Basic and Acid Steel Furnaces, Glass and Copper Tank Furnaces. Extra Shapes MADE TO ORDER.

Office, Room 21, Conestoga Bldg., Cor. Wood and Water Sts., PITTSBURG, PA.

The Chicago & North-Western Railway

REACHING with its 7,966 miles of road the famous Water Powers, Coal Fields, Iron Ore Ranges, Hard and and Soft Lumber Districts located in Illinois, Wisconsin, Michigan, Iowa, Minnesota, South Dakota, North Dakota, Nebraska and Wyoming, and by traffic arrangements with other railways, 7,350 stations located on 41,000 miles of railroad (one-ninth of the entire railroad mileage of the world, and one-fourth of the railroad mileage of the United States), has on its line more industries than any other western railroad.

Manufacturers contemplating moving or establishing branch factories in the West are requested to inquire what we can offer them before locating elsewhere.

M. HUGHITT,
General Freight Agent,
CHICAGO.

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 35
Shell	1 45
Flange	1 55
Marine Flange	1 60
Fire Box	2 05

Above includes plates 90 inches wide.

90 to 96 in. wide	⅛c. lb. extra
96 to 100 in. wide	1c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special.

Flats.	cts. lbs.
2 to 9-16 in. wide by 2 to ½ thick	.08

Bessemer and O. H. Steel.

Bessemer Machinery	base price,	1 40
Open-hearth Tire	"	1 45
Open-hearth Spring	"	1 80
Sleigh Shoe	"	1 45
Toe Calk	"	1 90
Cutter Shoes, tapered and beat	"	1 60

American Cast Tool Steel.

ROUND, SQUARE, AND OCTAGON.	cts lbs.
1 to 2 in. inclusive	.08
9-16 to ⅞ in. "	.08
7-16 to ⅜ and 2⅜ to 3 in.	.09
3⅛ to 4 in.	.09½
⅝ to 11-16 and 4⅛	.10
1⅛ to 6 in.	.10½
¾ to 9-32 and 6⅛ to 7 in	.11
1 in.	.13

Burden Boiler Rivets.

⅛, ¾, 11-16 and ⅞ inches diameter	3 10
Bridge ⅛, ¾, 11-16 and ⅞ inch diam.	2 55

Wrought Pipe and Boiler Tubes.

Lap weld black,	base,	four ios.	.62
Butt "	"	four ios.	.62½
Lap "	galv. "	four ios.	.52½
Butt "	" "	four ios.	.50
Boiler tubes 2¼" and smaller			.70
Boiler tubes 2¼" and larger			.75
Casting screw and socket joint			dis. 52½
Casing inserted joint			dis. 47½

MACHINERY SUPPLY MARKET.

[From Store, Cleveland.]

Anti-Friction Metals.

Magnolia Anti Friction Metal, 25 cts. per lb., f. o. b. New York or Chicago.
No Name Metal, 18 cts. per lb., f. o. b. New York or Chicago.
Mystic Metal, 8 cts. per lb., f. o. b. New York or Chicago.

Anvils.

American	₱ lb 9@10
Wright's	₱ lb 13

Bellows.

Blacksmiths'	Hill's	dis 40
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 10 & 10
" " " extra	dis 60&10
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 50
Shultz Raw Hide Leather Belting, single	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.	dis 35

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 50
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 33⅓
Horton's Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 45
Sweetland "	dis 40
Almond Drill	dis 40
Morse "	dis 20
Skinner's Combination Lathe	dis 40&15
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 30

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 10 to 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	₱ 3½
Iron, steel points	₱ lb 3

Drill and Drill Sockets.

Twist Drills	
Morse Taper & Straight Shank to 1½"	dis 50 & 10 to 60
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 60@60&5
Cleveland " "	dis 60@60&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150 gr.	Flour, F. F
Kegs, 100 lb	4½c	3 c	2½c
½ kegs 50 lb	4¾c	3¼c	2¾c
¼ kegs 25 lb	5 c	3⅜c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10 lb cans less than 10	10 c	10 c	6c

Emery Cloth and Paper.

Barder, Adamson & Co. ..... dis 50@50&5
H. H. Barton ..... dis 50@50&5

Emery Wheels.

Detroit ..... dis 60@70
Norton's ..... dis 60@70
Crant ..... dis 60@70
Sterling ..... dis 60@70
Celluloid ..... dis 10&33⅓
Northampton ..... dis 50
Crystal ..... dis 65@70
Vitrified ..... dis 60@70
Vulcanite ..... dis 60&10
Hamden ..... dis 60&10@70
Cyclone ..... dis 60@60&10

Files.

Arcade ..... dis 60&10@60&10&10
Nicholson ..... dis 60&10@60&10&10
" X. F. ..... dis 25
Kearney & Foot ..... dis 60&10@60&10&10
Black Diamond ..... dis 60&10@60&10&10
McClellan ..... dis 60&10@60&10&10
Disston's ..... dis 65@70
Western ..... dis 70
Stub's ..... dis 25
Grobet's ..... dis 30
Reynolds Bros.' Hand Cut ..... dis 50
Industry File Works Hand Cut ..... dis 50

Hammers.

P. S. W ..... dis 40
Atha new list, Jan. 15, 1887 ..... dis 50
Heavy hammers and sledges under 5 lbs. 10c
" " " " over 5 lbs. 8c

Jack Screws.

Illinois Bolt Co. list ..... dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¾	4	3½	3⅛
Hexagon	15⅜	11⅛	8⅛	6	5¾	5¾	
Washers	9	8	7	5	4⅛	4½	4⅛

In lots less than 100 lbs, ¼ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

Standard Penny Nails, ¼ keg, base.
Car lots $1 30
Less than car lots $1 40

Oilers.

Zinc and Tin ..... dis 60
Brass and Copper ..... dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ¼ doz ..... dis 10&10&10

Rivets.

Iron, Thousand, list November 1, 1894 ..... dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894 ..... dis 60@65
Copper ..... dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in. ..... dis 50
Carpenters' " " " ..... dis 50
Morse " " " ..... dis 50
Pratt & Whitney " " new list ..... dis 10
Machine Screw Taps ..... dis 50
Pipe Taps to 2½ in ..... dis 70
Stay Bolt Taps ..... dis 25
Stove Bolt Taps ..... dis 50
Pulley Taps ..... dis 40

Vises.

Solid Box ..... dis 60
Parker's ..... dis 20@2
Prentiss ..... dis 2
Stephen's ..... dis 25@3
Barrett's ..... dis
Miller's Falls ..... dis
Merrill's ..... dis 15@
Howard ..... dis

Wire.

New List, Apr. 9, 1894

Brass ..... dis 35
Copper ..... dis 35c
Bright and annealed, Nos. 0@18 ..... dis 70&10&7
" " Nos. 19@26 ..... dis 75@75&5
" " Nos. 27@36 ..... dis 75&10&5
Coppered Nos. 0 to 18, market list ..... dis 70@70&
Galvanized Nos. 0 to 18 " " ..... dis65&
Tinned market Nos. 0 to 18 ..... dis 67½
Cast steel ..... dis 50
Tinned Broom Wire ..... dis 70&5@70&10
Annealed Fence, Nos. 8 and 9 ..... dis 75
Annealed Grape, Nos. 10 to 14 ..... dis 75
Stub's Steel Wire regular ..... 95c ¼ lb dis 35

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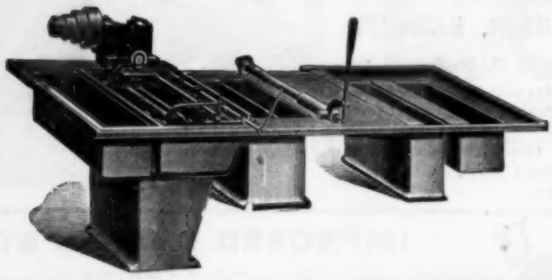

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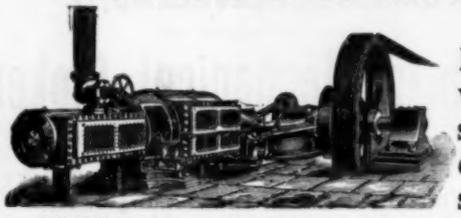

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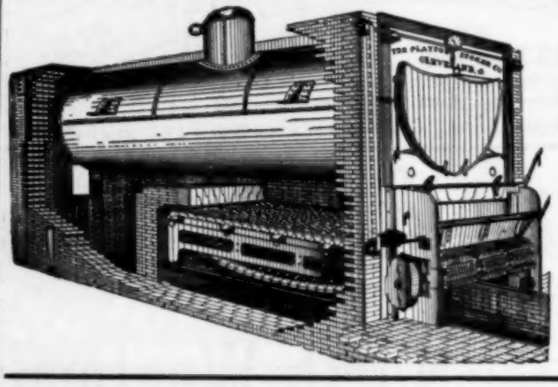

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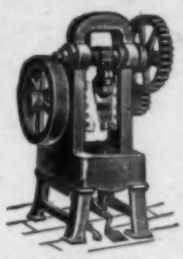

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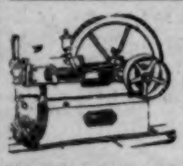

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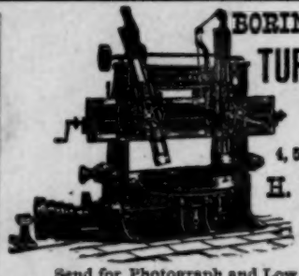

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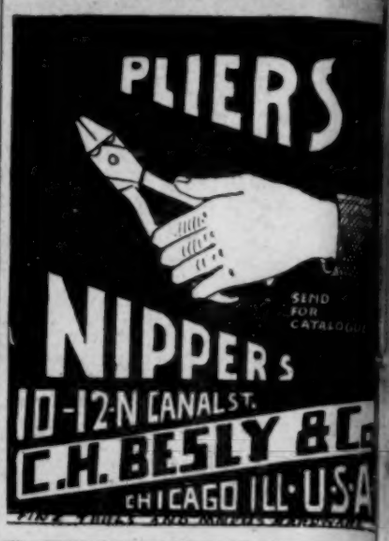

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